A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165

(An Autonomous College in the Jurisdiction of Krishna University)Accredited at the level 'A' by the **NAAC**

Sponsors: Siddhartha Academy of General& Technical Education

DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG (M.Sc.)

Date: 25-11-2020

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DEPARTMENT OF COMPUTER SCIENCE (PG)

Minutes of the meeting of Board of Studies in Computer Science for M.Sc. (Computer Science) programme held on 25th November 2020 at 11:00A.M. for the Department of Computer Science.

Members Present		
Name of the Member	**Role**	**Signature**
Smt. T.Keerthi, I/C HOD, Dept. of Computer Science, A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru-521165. Mobile: 9959558485 E-Mail: keerthitatineni16@gmail.com	Chairman	
Dr. K.Madhavi, Associate Professor, Dept of Computer Science, JNTUA. College of Engineering,Anantapur. Mobile: 9440206501 E-Mail:kasamadhavi@yahoo.com	University Nominee, Krishna University	
Dr.R.Satya Prasad, Professor, Department of Computer Science, Acharya Nagarjuna University, Nagarjuna Nagar-522508. Mobile: 9848487478 E-Mail: profrsp@gmail.com	Subject Expert	
Dr.T.S.Ravi Kiran, H.O.D& Assistant Professor, Dept of Computer Science, P.B. Siddhartha Degree College of Arts & Science-Vijayawada -520002. Mobile: 9441176980 E-Mail: kirantsr1 @gmail.com	Special Invitee	
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Smt. V. Munni, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile: 8099205522 E-Mail:munni.j2ee@gmail.com	Member	
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PG

AGENDA

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *First* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2020-21 and onwards.

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Second* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2020-21 and onwards.

RESOLUTIONS

- Resolved and recommended to adopt the Krishna University PG Regulation (R20) for the syllabus, model papers in the First Semester for the following courses:
  - Data Structures (20MCS101)
  - Programming & Problem Solving using Python (20MCS102)
  - Computer Organization (20MCS103)
  - Formal Language & Automata Theory (20MCS104)
  - Python Lab (20MCS105)
  - DS Lab (20MCS106)

- It is resolved and recommended to introduce new course "Technical report writing (TRW101) in the First Semester in addition to above courses

- Resolved and recommended to continue the same syllabus, model papers without changes in the Second Semester for the following courses:
  - Database Management Systems (20MCS201)
  - Software Engineering (20MCS202)
  - Operating System (20MCS203)

- Resolved and recommended to introduce new syllabus, model papers in the Second Semester for the following courses:
  - Computer networks (20MCS204)
  - Database Management system Lab (20MCS206L)
  - OEL programming of problem solving using python Program (20MCS205)

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)

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165

(An Autonomous College in the Jurisdiction of Krishna University)Accredited

at the level 'A' by the **NAAC**

Sponsors: Siddhartha Academy of General& Technical Education

DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG (M.Sc.)

Date: 10-06-2022

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE::VUYYURU

(An Autonomous College in the Jurisdiction of Krishna University)
Accredited at the level 'A' by the NAAC
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DEPARTMENT OF COMPUTER SCIENCE (PG)

Minutes of the meeting of Board of Studies in Computer Science for M.Sc. (Computer Science) programme held on 10-06-2022 at 11:00A.M. for the Department of Computer Science.

Members Present		
Name of the Member	**Role**	**Signature**
Smt. T.Keerthi, I/C HOD, Dept. of Computer Science, A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru-521165. Mobile: 9959558485 E-Mail: keerthitatineni16@gmail.com	Chairman	
Dr. K.Madhavi, Associate Professor, Dept of Computer Science, JNTUA. College of Engineering,Anantapur. Mobile: 9440206501 E-Mail:kasamadhavi@yahoo.com	University Nominee, Krishna University	
Dr.R.Satya Prasad, Professor, Department of Computer Science, Acharya Nagarjuna University, Nagarjuna Nagar-522508. Mobile: 9848487478 E-Mail: profrsp@gmail.com	Subject Expert	
Dr.T.S.Ravi Kiran, H.O.D& Assistant Professor, Dept of Computer Science, P.B. Siddhartha Degree College of Arts & Science-Vijayawada -520002. Mobile: 9441176980 E-Mail: kirantsr1 @gmail.com	Special Invitee	
Sri.U.Sairam,C.E.O, Codegnan I.T Solutions OPC PVT LTD., Vijayawada520002 Mobile:9959555952 E-Mail: uppugundlasairam@gmail.com	Industrialist	
Ms. P.Srujana, Software Developer, TonmetriInfoSolutions,Vijayawada. Mobile: 9032671688 E-Mail:srujanapaladugu26@gmail.com	Alumni Representative	
Smt. V. Munni, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile: 8099205522 E-Mail:munni.j2ee@gmail.com	Member	
Sri.B.MadhuSudhana Rao, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile:7842664766 E-Mail:ms.madhu27@gmail.com	Member	

PG

AGENDA

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Second* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2021-2022 and onwards.

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Fourth* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2021-2022 and onwards.

RESOLUTIONS

- Resolved and recommended to continue the same syllabus, model papers without changes in the Second Semester for the following courses:
  - Computer Networks (21CS2T1)
  - Data Structures (21CS2T2)
  - Web Technologies (21CS2T3)
  - Operating System (21CS2T4)
  - Data Structures Lab (21CS2L2)

- Resolved and recommended to introduce new syllabus, model papers in the Second Semester for the following courses:
  - Computer Networks & Operating System Lab (21CS2L1)

- To discuss and approve the *Structure*, S*yllabi* and *Model Question Papers* of Open Electives *"Computer Fundamentals & office Tools"* for Second Semester

- Resolved and recommended to continue the same syllabus, model papers without changes in the Fourth Semester for the following courses:
  - Cloud Computing (21MCS403)

- Resolved and recommended to introduce new syllabus, model papers in the Fourth Semester for the following courses:
  - PHP & MY SQL (21MCS401)
  - Big Data & Analytics (21MCS402)
  - Artificial Intelligence & Machine Learning (21MCS404)
  - Big Data & Analytics Lab (21MCS402L1)
  - Project Work (21MCS405)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - II Semester

Course	COMPUTER NETWORKS		
Course Code	20CS2T1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

1. Course Outcomes:

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

1. Understand functionality of *Layered Network Architecture*, Different types of *Transmission Media*. (CO1)
2. Understand various *Networks* and their functions.(CO2)
3. Understand the *IPAddresses*andvarious*RoutingAlgorithms*usedininternetworking.(CO3)
4. Understand different *Transport Layer Protocols*.(CO4)
5. Understand the various *Application Layer Protocols* and *Security Issues* over internet.(CO5)

Unit	Learning Units	Lecture Hours
I	**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, Internetworks. ***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, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP reference model, ***Example Networks*:** The Internet, The Third Generation Mobile Phone Networks, Wireless LANs, RFID and Sensor Networks. **Physical Layer: *Guided Transmission Media*:** Magnetic Media, Twisted Pair, Coaxial Cable, power lines, Fiber Optics	14
II	**Data Link Layer: *Data Link Layer Design Issues***: Services Provided to the Network Layer, Framing, Error Control, and Flow Control. ***Error Correcting Codes***, ***Error Detecting Codes***, ***Elementary Data Link Protocols***: An Utopian 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. **The Medium Access Control Sub Layer: *Ethernet***: Ethernet Cabling, Manchester	14

	Encoding, The Ethernet MAC sub layer Protocol, The Binary Exponential Back off Algorithm, Ethernet Performance, Switched Ethernet, Fast Ethernet, Gigabit Ethernet,10-bit Gigabit Ethernet. Wireless Lans: The 802.11 Protocol Stack, The 802.11 Physical Layer, The 802.11 MAC Sub Layer Protocol, The 802.11Frame Structure, Bluetooth: Bluetooth Architecture, Bluetooth Applications, The Bluetooth Protocol Stack, The Bluetooth Radio Layer, The Bluetooth Link Layers, The Bluetooth Frame Structure, Data Link Layer Switching: Uses of Bridges, Learning Bridges ,Spanning Tree Bridges, Remote Bridges,Repeaters,Hubs,Bridges,Switches,RoutersandGateways,VirtualLANs.	
III	**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. ***Internet Working*:** How Networks Differ, How Networks can be connected, Concatenated Virtual Circuits, Connectionless Internetworking, Tunneling, Internetwork Routing, Packet Fragmentation**.** ***The Network Layer in the Internet*:** The IPVersion4Protocol, IP address, Internet Control Protocols, OSPF, The Internet Gateway Routing Protocol, BGP, The Exterior Gateway Routing Protocol.	10
IV	**The Transport Layer:** ***The Transport Service*:** Services provided to the Upper Layers, Transport Services Primitives, and Berkeley Sockets. ***Elements of Transport Protocols***: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing. ***The Internet Transport Protocols*:** Introduction to UDP: Remote Procedure Call, The Real Time Transport Protocol. **The Internet Transport Protocols:** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modelling TCP Connection Management, TCP Sliding Window, TCP Congestion Control, TCP Timer Management, Future of TCP.	10
V	**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 Pages, Dynamic Web Pages and Web Applications**.** **HTTP**-The Hyper Text Transfer Protocol. ***Streaming Audio and Video***: Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, Real Time Conferencing. ***Network Security*:** Introduction to Cryptography, Public Key Algorithms-RSA.	12

Prescribed Text Book

	Author	Title	Publisher
1	Andrews.T anenbaum	Computer Networks	Fifth Edition, Pearson **Chapters:**1.1to1.5,2.2,3.1to3.4,4.3, 4.4,4.6,4.85.1,5.2.1to5.2.8,5.5,5.6.1 to5.6.4,5.6.6,5.6.7,6.1.1to6.1.3,6.2.1t o6.2.5,6.4,6.5,7.1,7.2,7.3.1to7.3.4, 7.4.1to7.4.5,8.1.1,8.3.1

Reference Text Book

1	Behrouz AForouzan,Firouz	Computer Networks A Top Down Approach	McGraw hill Education (India) Special Indian Edition

	Mosharaff		
2	JamesF.Kurose,Keith W.Ross	Computer Networking-A Top-Down Approach	6e,Pearson
3	Larry Peterson and Bruce Davie	Computer Networks-A System Approach	5e,ElsevierIndia

A.G &S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme-II Semester

Course Code: 20CS2T1 Title: COMPUTER NETWORK
Time: 3Hours Max.Marks:70

SECTION-A

Answer ALL questions **(10×2=20Marks)**

1a) Distinguish between *Computer Network* and *Distributed System*.(BTL4)
b) What is *Bit Stuffing*? (BTL1)
c) How *Ethernet Switch* works?(BTL1)
d) What is *Ubiquitous Computing*?(BTL1)
e) What is count to *Infinity Problem*? (BTL1)
f) How *Router* works?(BTL1)
g) What is *Berkley Socket*? (BTL1)
h) What is *Port Mapper*?(BTL1)
i) What are *Resource Records*? (BTL1)
j) Whatis*POP3*?(BTL1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit**.**
All Questions Carry Equal Marks. **(5×10=50Marks)**

UNIT–I

11a) Explain *OSI Reference Model* with neat diagram. (BTL2)
(OR)
B) Explain Error *Correction And Detection Codes* with example.(BTL2)

UNIT –II

12a) Explain *Sliding Window Protocol* with neat diagram. (BTL2)
(OR)
b) Explain *Bluetooth Architecture* and its *Protocol Stack* with neat diagram.(BTL2)

UNIT –III

13a) Explain any two *Dynamic Routing Algorithms.* (BTL2)
(OR)
B) Explain *IPV4 Packet Format* with neat diagram. (BTL2)

UNIT–IV

14a) Explain *Real Time Protocol.* (BTL2)
(OR)
b) Explain*ConnectionEstablishment*and*Termination*withneatdiagram.(BTL2)

UNIT–V

15a) Explain *Session Initiation Protocol*.(BTL2)
(OR)
b) Explain *HTTP Request* and *HTTP Response* Messages.(L2)

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
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M.Sc., (Computer Science)Programme-II Semester

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTERNETWORKS& OPERATING SYSTEMSLAB	20CS2L1	-	-	8	4	2020-21

Course Outcomes:
On successful completion of this course, the students:

- Practice *Unix Shell Scripting* and *AWK Programming*.(CO1)
- Apply *Operating System Scheduling Algorithms*.(CO2)
- Prepare *Patch Cards* and Implement *Network Monitoring Tools*.(CO3)
- Implement Network Programming to *obtain IP address*, *Machine Name* and *Communication* etc.(CO4)
- Design various networks with *CISCO Packet Tracer* and implement *Network Algorithms*.(CO5)

LAB LIST PART A
Shell Scripting

1. Introduction to basic UNIX commands.
2. Write a shell script to accept the name of the file from standard input and perform the following tests on whether the file exists, if exists test file permissions whether file is executable , readable ,writable ,both read &writable.
3. Write a script that will ask user, full name (first, middle, last name) greet user by first name. Ask users DOB and calculate user's age.
4. Write a shell script which will display Fibonacci series up to a given number of arguments.
5. Write a shell script to accept student number, name, and marks in 5subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat Rules: if avg>=90gradeA+,80-89gradeB+,70-79gradeB,69-69gradeC+,51-50gradeC,41-49gradeDelsegradeF
6. Write a shell script to accept empno, empname, and basic. Find DA, HRA, TA, PF using following rules. Display empno, empname, and basic, DA, HRA, PF, TA, GROSS SAL and NETSAL. Also store details in a filecalledemp.dat.Rules:DAis18%of basic if basic>5000otherwise 550DAis35% of basic, PFis12% of basic +DA,TA is10% of basic.
7. Write a shell script to display reverse numbers from given arguments

AWK scripting

Write a wk script for the following

1. To print the num bers of even lines Ina file.
2. To print the Numbers Of odd lines in A file.
3. To delete empty lines in a File.
4. To display lines having more than 60characters.
5. To display the lines which match the multiple patterns?
6. To display the lines which do not match the Patterns?
7. To display the Lines or Records5-9 both inclusive.
8. Write a wk script for the following
9. To display the lines between two patterns (both inclusive).
10. To display the specified line5 or record in a file.
11. List out the file swhich are created in March.
12. Print the total size occupied by the file sin your directory.
13. Print the all lines by changing into upper case.

14. Print line where fields have multiple field separators.
15. Write an awk program to display employee's pay bill (data file may be comma separated file containing (eno,name,basic) calculate DA,HRA,TA,PF(basic+da)

PART B

1. Scheduling algorithms (BTL3)
2. Write program to implement FCFS scheduling algorithm.
3. Write program to implement Round Robin scheduling algorithm.
4. Write program to implement SJF scheduling algorithm.

PART C

1. .Study different type of Guided media .Coaxial, UTP & OFC
2. .Prepare straight and cross wire cable and test it.
3. Study net work devices in detail (repeater, hub, switch, router, and gateway).
4. Study of IP address (IPV4 –classification, Sub netting, super netting, IPV6).
5. Connect the computers in a local area Network.
6. Study basic net work commands (ping ,finger ,ftp ,tracer oute ,ns lookup ,pathping, telnet,arp).

PART D(Implementing Python/Java)

1. Program to fetch the IP address of a system.
2. Program to obtain the information about the(a)Host (b)Port(c)protocol.
3. Write a program to accept the Website name and return its IP address.
4. Write a program to implement echo client and echo server.
5. Write a program to implement TCP client-server program.
6. Write a program to use Simple Mail Transfer Protocol.
7. Write a program to use the Domain Name System using UDP.
8. Implementation of sliding window protocol.
9. Find the subnet mask and Net work address fort hegiven IP address.

PART E (Using Cisco packet tracer 6.5 (freely available))

1. Configure a net work using a server with five no disusing packet tracer.
2. Configure a net work using a DHCP server with five no disusing packet tracer.
3. Configure a net work using two DHCP servers with no disusing packet tracer.
4. Configure a net work using three DHCP servers with nodes using packet tracer.
5. Configure a net work with DHCP servers with wired and wireless no des using Cisco packet tracer.
6. Exhibit spanning tree algorithms

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (Computer Science) Programme - II Semester

Course	DATASTRUCTURES		
Course Code	20CS2T2	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:

On successful completion of this course, the students:

1. Todefinedatastructures,operationofdatastructure,timeandspacecomplexities.(CO1)
2. To understand concepts of string processing, arrays, records and pointers, linked lists, stacks, queues, recursion, trees, graphs & searching techniques. about searching and sorting techniques.(CO2)
3. Toimplementapplicationsoflinkedlists,stacks,queues,trees,graphs,sorting&searchingtechniques.(CO)
4. To analyze applications of linked lists, stacks, queues, trees, graphs, sorting & searching techniques.(CO4)
5. To evaluate applications of linked lists, stacks, queues, trees, graphs, sorting & searching techniques in terms of time & space complexity.(CO5)

Unit	Title	Lecture Hours
I	**Introduction and Overview:** Elementary Data Organization, Data Structures, Data Structure operations, Algorithms: Complexity, Time-Space Trade off. **Preliminaries:** Mathematical Notation and Functions, Algorithmic Notation, Control Structures, Complexity of Algorithms, Other Asymptotic Notations, Sub Algorithms, Variables, Data Types.	14
II	**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.	14
III	**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, Arithmetic Expressions; Polish notation, Quick Sort, Recursion, Towers of Hanoi, Implementation of recursive procedures by stacks, Queues, Linked representation of Queues, De-queues, Priority Queues.	14

IV	**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 Search Trees, M-way Search Trees, Searching, Insertion and Deletion in M-way Search Trees, B-Trees, Searching, Insertion and Deletion in B-Trees, Heap: Heap Sort, Huffman's Algorithms, General Trees.	14
V	**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.	14

Prescribed Text Book

	Author	Title	Publisher
1	Seymour Lip schutz	Data Structures	The Mc Graw Hill(Schaum'sOutlines), 2011

Reference Text Books

	Author	Title	Publisher
1	Seymour Lipschutz	Theory and Problems of Data Structures	The Mc GrawHil l(Schaum's Outlines)
2	Aho, Hopcroft & Ullman	Data Structures & Algorithms	Addison-Wesley
3	M.A.Weiss	Data Structures &Algorithms in C	Addison Wesley

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
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M.Sc., (Computer Science) Programme-II Semester

Course Code: 20CS2T2 Title: DATA STRUCTURES
Time: 3Hours Max.Marks:70

SECTION-A

Answer ALL questions (10×2=20Marks)

1. Define *Data Structures*.(BTL1)
2. What is *Space Complexity?* (BTL1)
3. What is *Linear Array*?(BTL1)
4. What is *Sparse Matrix*?(BTL1)
5. Define a *Priority Queue*.(BTL1)
6. What is *Garbage Collection?*(BTL1)
7. Define a *Binary Tree*.(BTL1)
8. Define *AVL Tree*. (BTL1)
9. Define *Graph*.(BTL1)
10. What is *Sorting*?(BTL1)

SECTION-B

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

UNIT–I

11a) DiscussElementaryDataOrganizationandDataStructureOperations.(BTL6)

(OR)

b)Explainvarious*ControlStructures*.(BTL2)

UNIT–II

12a) ExplainBinarySearchAlgorithmandLinearSearchAlgorithmwithanexample.(BTL2)

(OR)

b)Discuss*TheSecondPatternMatchingAlgorithm*withexample.(BTL6)

UNIT–III

13a).Explain*QuickSort Algorithm* with example.(BTL2)

(OR)

b)Explain *OperationsofStack*anditsrepresentationusing*LinkedList* and*Array*withexample.(BTL2)

UNIT–IV

14a) Discuss Binary Tree Traversal Techniques using Stack in detail.(BTL6)

(OR)

B) Brieflydiscussabouttheinsertionand deletionoperationsof*Binary SearchTrees*
With example.(BTL6)

UNIT–V

15a) ExplaintheprocessofTopologicalSorting.(BTL2)

(OR)

b)Discussabout*MergeSort* with an example.(BTL6)

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme-II Semester

COURSE	COURSE CODE	L	T	P	C	Year
DATASTRUCTURESLAB	20CS2L2	-	-	8	4	2020-21

Course Outcomes:

- On successful completion of this course ,the students:
- Understands the concept of Stacks, Queues, and Tree Traversals.(CO1)
- ApplytheoperationsofSinglyLinkedLists,DoublyLinkedLists,CircularLinkedListsandOperationsonStacksand Queues.(CO2)
- ApplyoperationsonBinarySearchTree,BinarySearchTreeTraversals,SparseMatrixandDFS&BFSAlgorithm.(C O3)
- Implement Searching& Sorting Algorithms.(CO4)
- Implement AVL-Trees and B-Trees.(CO5)

CYCLE1

1. Write a Java Program to create class called Stack and implement Stack Operations.
2. Write a Java Program to create a class called Queue and implement Stack Operations.
3. Write a Java Program to convert the Infix to Postfix Expression.
4. Write a Java Program to evaluate Post fix Expression.
5. Write a Java Program to obtain the Binary Number for a given Decimal Number.

CYCLE 2

1. Write a Java Class to implement the operations of a Singly Linked List.
2. Write a Java Class to implement the operations of a Doubly Linked List.
3. Write a Java Class to implement the operations of a Circular Linked List.
4. Write a java program for the following a) Reverse a Linked List b)Sort the data in a Linked List c)Remove Duplicates d)Merge Two Linked Lists
5. Write a java program for performing various operations on Stack using Linked List.
6. Write a java program for performing various operations on Queue using Linked List.

CYCLE 3

1. Write a Java Program to implement operations on Binary Trees Using Recursive and Non-Recursive Methods.
2. Write a Java Program to perform Binary Search Tree Traversal.
3. Write a Java Program to implement Sparse Matrix.
4. Write a Java Program to implement DFS Algorithm.
5. Write a Java Program to implement BFS Algorithm.

CYCLE4

1. Write a Java Program to implement the following sorting techniques:
   a.Bubble Sort b. Merge Sort. c. Quick Sort. d. Heap Sort.
2. Write a java program to implement Quick Sort of given elements.
3. Write a Java Program to implement the Following search techniques:
   a. Linear Search b. Binary Search

CYCLE5

1. Write a java program to implement various operations on AVL Trees.
2. Write a java program to perform the following operations
   a) Insertion in to a B-Tree b) Searching in a B-Tree

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester

Course	WEB TECHNOLOGIES		
Course Code	20CS2T3	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision:

Course Outcomes:

On successful completion of this course, the students:

1. Students are able to describe the concepts of WWW including browser and HTTP protocol and various HTML tags and use them to develop the user friendly WebPages.(CO1)
2. Students will be able to use the Java Script and VBScript to develop the dynamic WebPages.(CO2)
3. StudentswillbeabletodefinetheCSSwithitstypesanddevelopthemodernwebpagesusingtheHTMLandXMLelementswithdifferentlayoutsasperneedofapplications.(CO3)
4. StudentsuseserversidescriptingwithPHPtogeneratethewebpagesdynamically using the database connectivity.(CO4)
5. DevelopthemodernWebapplicationsusingtheclientandserversidetechnologiesandthewebdesignfundamentals.(CO5)

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Internet, History of Internet, Internet Services and Accessibility, Uses of the Internet, Protocols, Web Concepts: The Client/Server Model, Retrieving Data from the Web, How theWebWorks?,WebBrowsers,SearchinginformationontheWeb,InternetStandards. **HTML:** Outline of an HTML Document, Head Section Body Section: Headers, Paragraphs, Text Formatting, Linking, Internal Linking, Embedded Images, Lists, Tables, Frames, Other Special Tags and Characters, HTML Forms.	12
II	**Java Script:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays, Objects, Document Object Model, Events. **VB Script:** Introduction, Embedded VBScript code in an HTML Document, Comments, Variables,ArrayVariables,Operator,AssignmentOperators,NumericalOperators,StringConcatenation,Procedures, Sub Procedure, Function Procedure, Conditional Statements, Looping Statements, Object and VB script, Cookies, Cookie Variables, Creating a Cookie, A Cookie with Multiple Values, Reading Cookie Value.	12

III	**Dynamic HTML (DHTML):** Introduction, Cascading Style Sheets (CSS), Coding CSS, Properties of Tags, Property Values, Other Style Properties, In Line Style Sheets, Embedded Style Sheets, External Style Sheets, Grouping, Inheritance, Class as Selector, ID as Selector, Contextual Selector, Pseudo Classes and Pseudo Elements, Positioning, Backgrounds, Element Dimensions, DHTML Document Object Model and Collections, Using the Collections All, Moving Object around the Document, Event Handling, Assigning Event Handlers, Event Bubbling, Filters and Transition Filters, Transitions, Data Binding, Using Tabular Data Control, Sorting Data, Dynamic Sorting, Filtering. **XML:** Introduction, HTML Vs. XML, syntax of XML document, XML attributes, use of elements Vs. use of attributes, XML validation, well formed XML documents, valid XML documents. **XML DTD:** Internal DTD, External DTD, the building blocks of XML documents. **DTD Elements:** Declaring an Element, Empty Elements, Elements with data, Elements with Children, Wrapping, Declaring only one occurrence of the same Elements, Declaring minimum one occurrence of the same Element, defining Zero or One occurrence of the same element, declaring mixed content. **DTD Attributes:** Declaring Attributes, Default Attribute Value, Implied Attribute, Required Attribute, Fixed Attribute Value, Enumerated Attribute Values, DTD Entries, DTD Validation, XSL, XSL Transformation, XSL Name Spaces, XML Schema.	12
IV	**Servlets:** Introduction, Advantages of Servlets over CGI, Installing Servlets, The Servlet Life Cycle, Servlets API, A Simple Servlet, Handling HTTP *Get* requests, Handling HTTP Post Requests, Cookies, Session Tracking, Multi Tier Applications using Database Connectivity, Servlets Chaining. **PHP:** Introduction ,PHP basics, String Processing and Regular Expressions, Form Processing and Business Logic, Connecting to a Database, Using Cookies, Dynamic Content, Operator Precedence Chart.	12
V	**Java Server Pages (JSP):** Introduction, Advantages of JSP, Developing first JSP, Components of JSP, Reading Request Information, Retrieving the Data Posted from a HTML File to a JSP File, JSP Sessions, Cookies, Disabling Sessions. **Active Server Pages (ASP):**Introduction, Advantages of ASP, First ASP Script, Processing ASP Scripts with Forms, Variables and Constructs, Subroutines, Include/Virtual, ASP Cookies, ASP Objects, Connecting to Data with ASP.	12

Prescribed Text Book

	Author	Title	Publisher
1	N.P.Gopalan, J.Akilandeswari	Web Technologies-A Developer's Perspective	PHI(2008)
2	HarveyM.DeitelandPaul1.Deitel	InternetandWorldWideWebHowToProgram,5e	PrenticeHall;4thedition

Reference books

1	Robert W.Sebesta	Programming the world wide web.	Third Edition,
2	Anders Moller and Michaelschwarzbach	An Introduction to XML and web Technologies.	Addison Wesley (2006)

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc.,(Computer Science)Programme-II Semester

Course Code: 20CS2T3 Title: WEB TECHNOLOGIES Time: 3Hours Max.Marks:70

Answer ALL questions (10×2=20Marks)

1. Write about *HTTP*.(BTL1)
2. Explain *TABLE* tag.(BTL2)
3. What are *Identifiers* in JavaScript?(BTL1)
4. Write the syntax of *VB Script*.(BTL1)
5. What is a *Valid XML document*?(BTL1)
6. Explain *Event Bubbling*.(BTL2)
7. What is a *Servlet*? (BTL1)
8. What are *Regular Expressions* in PHP?(BTL1)
9. What are *Scriplets*?(BTL1)
10. Write about *Subroutines*.(BTL1)

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10=50Marks)**

UNIT-I

11a)What is Internet? Explain Services of Internet.(BTL1)

Or

b) Illustrate Frame Set and Frame Attributes by writing program.(BTL2)

UNIT-II

12a)Explain the scope of Java Scrip Variables with example.(BTL2)

Or

b)Explain Document Object Model in Java Script briefly.(BTL2)

UNIT-III

13a)Discuss building an External Style Sheet. Explain advantages and disadvantages of External Style Sheets with an example.(BTL6)

Or

What is DTD? Explain the building blocks of DTD.(BTL1)

UNIT-IV

14a) Explain the Life Cycle of Servlets. Write the session tracker that tracks the number of access and last access of data of a particular webpage.(BTL2)

Or

b) Explain String Processing and Regular Expressions.(BTL2)

UNIT-V

15a) Explain Components of JSP and write a JSP Program to accept username and password from user and Validate them.(BTL2)

Or

b)Explain Processing *ASP Scripts* with *Forms*.(BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - II Semester

Course	OPERATINGSYSTEMS		
Course Code	20CS2T4	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:

On successful completion of this course, the students:

1. Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.(CO1)
2. ApplyingconceptsofThreads,ProcessSynchronization&CUPScheduling.(CO2)
3. Understand Deadlock, Main Memory & Virtual Memory.(CO3)
4. Explain Mass Storage Structure, File System Interface & File System Implementation.(CO4)
5. Understanding on I/O Systems, Protection & Security.(CO5)

Unit	Learning Units	Lecture Hours
I	**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, Kernel Data Structures, Computing Environments, and Open Source Operating Systems? **Operating-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. **Processes:** Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication, Communication in Client-Server Systems.	12
II	**Threads:** Overview, Multi core Programming, Multithreading Models, Thread Libraries, Implicit Threading, and Threading Issues. **Process Synchronization:** Background, The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple Processor Scheduling.	10

III	**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **Main Memory:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Intel32 and 64-bit Architectures. **Virtual Memory:** Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing.	14
IV	**Mass Storage Structure:** Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap Space Management, RAID Structure. **File System Interface**: File Concept, Access Methods, Directory and Disk Structure, File System Mounting Protection. **File System Implementation**: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management Efficiency and Performance Recovery.	10
V	**I/O Systems:** Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations, STREAMS, Performance. **Protection:** Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of the Access Matrix. **Security:** The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Firewalling to Protect Systems and Networks.	14

Prescribed Text Book

	Author	Title	Publisher
1	Abraham Silbers chatz,	Operating Concepts	System

Reference Text Books

	Author	Title	Publisher
1	William Stallings	Operating Systems-Internals and Design Principles	Fifth(2007)
2	Achyut God bole	Operating Systems	Operating Systems
3	Flynn/McHoes	Operating Systems	Cengage Learning (2008).

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc.,(Computer Science)Programme-II Semester

Course Code: 20CS2T4 Title: OPERATING SYSTEMS
Time: 3Hours Max.Marks:70

Answer ALL questions **(10×2=20Marks)**

1a)Define *Kernel*(BTL1)
b) What is *Process* (BTL1)
c) What is *Deadlock*?(BTL1)
d) What is *Semaphore*? (BTL1)
e) What is *Multithreading*?(BTL1)
f) What is *Swapping*?(BTL1)
g) Describe any two *File Operations*.(BTL2)
h) What is *File Pointer*? (BTL1)
i) What is *Spooling*?(BTL1)
j) What is *Access Matrix*? (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

UNIT–I

2a) Explain *Operating System Services*.(BTL2)
(OR)
b) Explain various aspects of *Interposes Communication*.(BTL2)

UNIT–II

3a) Describe the *Dining Philosophers Problem* of Process Synchronization.(BTL2)
(OR)

b) Demonstrate (BTL2)
First-Come, First-Served Scheduling with the following data

Process	Burst Time
P1	24
P2	3
P3	3

Shortest-Job-First Scheduling with following data

Process	Burst Time
P1	6
P2	8
P3	7
P4	3

UNIT–III

4a) What are the *Necessary and Conditions* for *Dead Lock Situation* and also state methods for *Deadlock Prevention.*(BTL

(OR)

b) With reference string7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames implement *Optimal Page Replacement* and *LRU Page Replacement*.(BTL4)

UNIT–IV

5a) Describe various levels of RAID. (BTL2)

(OR)

b) Describe various *Allocation Methods* of *File System Implementation*.(BTL2)

UNIT–V

6a) Explain the concepts of STREAMS in detail.(BTL2)

(OR)

b) What is Encryption? Describe *Symmetric Encryption* &*Asymmetric Encryption* in Detail. (BTL1)

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
(An Autonomous College in the jurisdiction of Krishna University)
Open Elective-II Semester

COURSE	COURSE CODE	L	T	P	C	Year
DATAVISUALIZATION	20CS2OEL1	4	-	-	4	2020-21

Course Outcomes:

After completion of the course the student will be able:

- To know the importance of *Data Visualization* in the world of *Data Analytics* and *Prediction*.
- To get familiarized about creating visualization using *Different Types* of *Charts*.
- To know creating and handling *Tables* in Tableau.
- To gain knowledge about using *Maps* in Tableau
- To gain knowledge about *Adhoc Analysis*.

UNIT I:

Creating Visual Analytics with Tableau Desktop, Connecting to Your Data - How To Connect To Your Data, What Are Generated Values?, Knowing When to use a Direct Connection, Joining Tables With Tableau, Blending Different Data Sources in a Single Worksheet.

UNIT II:

Building Your First Visualization-How Me Works-Chart Types, Text Tables, Maps, Bar Chart, Line Charts, Area Fill Charts and Pie Charts, Scatter Plot, Bullet Graph, Gantt Charts, Sorting Data In Tableau, Enhancing Views With Filters, Sets Groups and Hierarchies.

UNIT III:

Creating Calculations to enhance Your Data - What is Aggregation, What are Calculated Values and Table Calculations, Using the Calculation Dialog Box to Create, Building Formulas Using Table Calculations, Using Table Calculation Functions.

UNIT IV:

Using Maps to Improve Insights - Create a Standard Map View, Plotting Your Own Locations on a Map, Replace Tableau's Standard Maps, and Shaping Data to enable Point-to-Point Mapping.

UNIT V:

Developing an Adhoc Analysis Environment - Generating New Data with Forecasts, Providing Self Evidence Adhoc Analysis with Parameters, Editing Views in Tableau Server.

Prescribed Text Book			
	Author	Title	Publisher
1	DanielG.MurrayandtheInter Works BI Team	Tableau Your Data	Wiley Publications

Reference Text Books			
	Author	Title	Publisher
1	Ashutosh Nandeshwar	Tableau Data Visualizaton Cookbook	PACKT Publishing
2	Cole Nussbaumer ,Knaflic	Storytelling with Data : A Data Visualization Guide for Business Professionals	Wiley Publishing

A.G&S.G Siddhartha Degree College of Arts & Science, Vuyyuru - 521165.
(An Autonomous College in the jurisdiction of Krishna University)
OPEN ELECTIVE

Course Code: 20CS2OEL1 Title: DATAVISUALIZATION

Time: 3Hours Max.Marks:70
Answer ALL questions (10×2=20Marks)

1. What is *Analytics?*(BTL1)
2. Explain *Data*.(BTL2)
3. What is *Filter?*(BTL1)
4. Explain *Set*.(BTL2)
5. Explain *Aggregation*.(BTL2)
6. What is *Calculated Value?*(BTL1)
7. What is a *View?* (BTL1)
8. Explain *Standard Map*.(BTL2)
9. What is *Forecast?*(BTL1)
10. What is *Analysis?*(BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

UNIT-I

11a) what are generated values? (BTL1)

(OR)

b) Explain Joining Tables with Tableau. (BTL2)

UNIT–II

12a).How to build visualization using *Text Tables, Maps, Bar Chart, Line Charts*.(BTL1)

(OR)

b).Explain *Sorting Data* in Tableau.(BTL2)

UNIT–III

13a).What is *Building Formulas* using *Table Calculations*? (BTL1)

(OR)

b).Write about *Creating Calculations* to enhance your data and *Table Calculations*.(BTL1)

UNIT–IV

14a).Explain *Plotting Your Own Locations* on a Map.(BTL2)

(OR)

b).How to Replace Tableau's *Standard Maps*? (BTL2)

UNIT–V

15a) Explain Developing an *Adhoc Analysis Environment* and how to generate *New Data from Forecasts.*(BTL2)

(OR)

b).How to provide *Self Evidence Adhoc Analysis* with *Parameters.*(BTL1)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.(An Autonomous College in the jurisdiction of Krishna University)

M.Sc., (Computer Science) Programme – IV Semester

M.Sc(Cs)	**IV**	**MOOCS**	**21MCS401**	**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**	**4**
	4	**-**		**30**	**70**	

Course Objectives

The Main Course Objective is to give knowledge for Students on MOOC'S Courses

Course Outcomes

After Studying this Paper Student will acquire knowledge about MOOC's Courses

- The Student has to enroll and complete any one of the **Computer Related Course** (**4 Credits Equivalent**) from MOOC's platforms like NPTEL, SWAYAM etc.
- The Student is excepted to submit the above course pass certificate otherwise, the Department of M.Sc (cs) will conduct the evaluation (as per the prescribed format in the academic regulations) to issue the pass certificate.
- The selection of the course by the student can be done under the supervision of mentor.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

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M.Sc., (Computer Science) Programme – IV Semester

Course	MOOCS		
Course Code	21MCS401	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours /Week	4	Semester End Exam Marks	70
Total No.of Lecture Hours	-	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

COURSE OUTCOMES

CO1: To introduce the concept of PHP and to give basic Knowledge of PHP.
CO2: Learn about PHP Syntax., Arrays, PHP Loops,
CO3: Understood the PHP form handling.
CO4: Understand Working with Files and Directories:
Co5: Understand basic concepts of MySql and PHPMyAdmin, how a database stores information via tables, Understanding of SQL syntax used with MySQL,Review of some sample PHP projects interacting with MySql

MODULE 1 Installing and Configuring MySQL: 10 Hrs

Current and Future Versions of MySQL, How to Get MySQL, Installing MySQL on Windows, Trouble Shooting your Installation, Basic Security Guidelines, Introducing MySQL Privilege System, Working with User Privileges. Installing and Configuring Apache: Current and future versions of Apache, Installing Apache on Windows, Apache Configuration File Structure, Apache Log Files, Apache Related Commands, Trouble Shooting. Installing and Configuring PHP: Building PHP with Apache on Windows, The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow Loops.

MODULE 2 – Working with Functions and Arrays: 10 Hrs

Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope. Working with Arrays: Creating Arrays, Some Array-Related Functions. Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

MODULE – 3 Working with Forms: 15Hrs

Creating Forms, Accessing Form – Input with User defined Arrays, Combining HTML and PHP code on a single Page, Sending Mail on Form Submission, Working with File Uploads. Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session Ids in the Query String, Destroying Sessions and Unsetting Variables

MODULE – 4 : Working with Files and Directories: 10Hrs

Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen (), Running Commands with exec(), Running Commands with system ( ) or passthru ( ). Working with Images: Understanding the Image-Creation Process, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

MODULE – 5 : Interacting with MySQL using PHP: 15 Hrs

Introduction to My SQL and Interfacing with Databases through PHP understanding thedatabase design process: The Importance of Good Database Design, Types of TableRelationships, Normalization. Learning basic SQL Commands: Learningthe MySQL Data types, Learning the Table Creation Syntax, Using Insert Command,Using SELECT Command, Using WHERE in your Queries, Selecting from MultipleTables, Using the UPDATE command to modify records, Using RELACE Command,Using the DELETE Command, Frequently used string functions in MySQL, UsingDate and Time Functions in MySQL. Interacting with MySQL using PHP: MySQLVersus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

References:

1. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach yourself, PearsonEducation (2007).
2. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson(2006)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 21MCS401 **Title: PHP MYSQL**

Time: 3Hours Max.Marks:70

SECTION-A

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

1. **a).** What is PHP?
   b). List out PHP Data types?
   c). Define function?
   d). Describe objects?
   e). List out string functions?
   f). What is Cookie?
   g). how to create an image?
   h).what are the different types of table relationships?
   i). Write a syntax of Update command.
   j). differences between MYSQL and MYSQLi functions?

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

UNIT -I

2. a) Write a procedure to install PHP on windows

(or)

b) Explain flow control statements in PHP?

UNIT -II

3. a) Explain about arrays?

(or)

b) Explain about date and time functions in PHP.

UNIT -III

4. a) What is form? How to create and accessing a form with an Example.

(or)

b) What is Session? How to start and destroy sessions in PHP.

UNIT -IV

5. a) Explain about files?

(or)

b) Explain about working with Directories.

UNIT -V

6. a) Write about MySQL DDL and DML Commands?

(or)

b) How to connect with MYSQL with PHP

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course	BIG DATA AND ANALYTICS		
Course Code	21MCS402	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:

On successful completion of this course, the students:

- Understand basics of Big Data. (CO1)
- Gain knowledge on *Big Data Analytics*. (CO2)
- Be familiar with *HDFS, and Hadoop environment*. (CO3)
- Have knowledge on Mongo DB. (CO4)
- Gain knowledge on PIG and Jasper soft. (CO5)

Unit	Learning Units	LH
I	**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.	12
II	**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.	10
III	**The Big Data Technology Landscape:** No-SQL, Hadoop, Why Hadoop?, Why not RDBMS?, RDBMS versus Hadoop, Hadoop Overview, HDFS, Processing Data with Hadoop, Interacting with Hadoop Ecosystem.	14
IV	**Introduction to Mongo DB:** What is Mongo DB?, Why Mongo DB?, Terms used in RDBMS and Mongo DB, Data types in Mongo DB, Mongo DB query language. **Introduction to Map reduce programming:** Introduction, Mapper, Reducer, Combiner, Practitioner, Searching, Sorting and Compression.	10

V	**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 Functions, Parameter Substitution, Word Count Example using Pig. **Jasper Report using Jasper soft:** Introduction to Jasper Reports, Connecting to Mongo DB No-SQL Database.	14

Prescribed Text Book

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

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 20MCS402 **Title: BIG DATA AND ANALYTICS**

Time: 3Hours Max.Marks:70

SECTION-A

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

1. **a).** Define big data?
b). Describe any five characteristics of big data
c). what is HDFS? List and Explain all the components of HDFS
d). Explain different challenges in Big data?
e). what is Mango DB?
f) Write Differences between RDBMS and Hadoop?
g) What is Map Reduce?
h) What is Data Serialization?
i) What is Yarn?
j) Explain the need of big data Analytics

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

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 No-SQL database?

(or)

b) Explain the types of No-SQL 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.

A.G & S.G Siddhartha Degree College of Arts and Science, Vuyyuru

(An Autonomous College in the jurisdiction of Krishna University

M.Sc.(Computer Science) Programme - IV Semester

COURSE	COURSE CODE	L	T	P	C	Year
BIG DATA AND ANALYTICS LAB	21MCS402	-	-	6	3	2020-21

Lab List

1. Hadoop standalone installation in Linux.

2. Hadoop installation on windows environment- VM virtual box.

3. Exploring Hadoop Distributed File System (HDFS).

4. Map Reduce Program - Word Count (Python).

5. Write a Map Reduce Program that mines weather data. (Python).

6. Installation of Apache Pig.

7. Pig-Basic Operations: LOAD, FOREACH, GENERATE, GROUP, JOIN, DUMP / STORE.

8. Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

9. Installation of Mongo DB.

10. CRUD (Create, Read, Update and Delete) operations in Mongo DB.

11. Implementation of Aggregate and Map Reduce function in Mongo DB.

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - IV Semester

Course	ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING		
Course Code	21MCS403	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2021-22	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:

1. Identify problems that are amenable to AI techniques and analyse search techniques to solve thoseproblems.
2. Awareness of representation languages like first order logic.
3. Formalize and implement different AI algorithms, various Knowledge Representations and identify the importance of planning to solve AI problems.
4. Understands about basics of machine learning and conceptual learning.
5. To acquire knowledge about ANN and Instance based learning**.**

Unit	Learning Units	Lecture Hours
I	**Introduction:** What Is AI? The Foundations of Artificial Intelligence, The History of ArtificialIntelligence. **Solving Problems by Searching:** Problem Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.	12
II	**First Order Logic:** Representation Revisited, Syntax and Semantics of First Order Logic, Using FirstOrder Logic, Knowledge Engineering in First Order Logic. **Inference in First Order Logic:** Propositional versus First Order Inference, Unification and Lifting,Forward Chaining, Backward Chaining, Resolution.	10

III	**Classical Planning:** Definition of Classical Planning ,Algorithms for Planning as State Space Search, Planning Graphs, Other Classical Planning Approaches, Analysis of Planning Approaches. **Knowledge Representation:** Ontological Engineering, Categories and Objects Events, Mental Eventsand Mental Objects.	14
IV	**Learning from Examples:** Forms of Learning, Supervised Learning ,Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classificationwith Linear Models. **Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.	10
V	**Artificial Neural Networks:** Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Back Propagation Algorithm, Remarks on the Back Propagation Algorithm, Recurrent Networks, Dynamically Modifying Network Structure. **Instance Based Learning:** Introduction**,** K-Nearest Neighbour Learning, Locally WeightedRegression, Radial Basis Functions, Case Based Reasoning.	14

Prescribed Text Book

	Author	Title	Publisher
1	Stuart J. Russell andPeter Norvig	Artificial IntelligenceA Modern Approach	Prentice Hall, Third edition,2010 1.1,1.2,1.3,3.1,3.2,3.3,3.4,3.5,3.6,8.1,8 .2,8.3, 8.4,9.1,9.2,9.3,9.4,9.5, 10.1,10.2,10.3,10.4,10.5,12.1,12.2, 12.3,12.4,18.1,18.2,18.3,18.4,18.5, 18.6,21.1, 21.2, 21.3, 21.4, 21.5, 21.6
2	Tom.M. Mitchell	Machine Learning	TMH(2013)4.2,4.3,4.4,4.5,4.6,4.8.3 ,4.8.4,8.1,8.2,8.3,8.4,8.5

Reference Text Books

	Author	Title	Publisher
1	Winston. P.H	Artificial Intelligence	Addison Wesley (1993)
2	Peter Flach	Machine Learning The Art and Science ofAlgorithms that Make Sense of Data	Cambridge University Press
3	Elaine Rich& Kevin Knight	Artificial Intelligence	TMH (1991)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 21MCS403 Title: ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING

Time: 3Hours Max.Marks:70

SECTION-A

1. **Answer ALL questions** **(10x2 = 20 Marks)**
   a) Define Artificial Intelligence (AI).
   b) Define Rational Agent
   c) Define Back Propagation
   d) Define Vector Machines
   e) What is K-Means Cluster?
   f) Define Kernal Methods.
   g) What is Polynomial regression?
   h) Define Kernal Estimator
   i) What is Q Learning?
   j) What is Fixed Combination Rules

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

2 a) What is AI? Discuss the Heuristic Search Techniques for solving problems.(BTL1)
(or)
b) Discuss Problem Solving Agents with Examples. (BTL6)

3 a) Explain the Syntax and Semantics of First Order Logic.(BTL2)
(or)
b) Demonstrate the concept of resolution with an example.(BTL2)

4 a) Explain how to design algorithms for Planning as State Space Search. (BTL2)
(or)
b) Discuss On to logical Engineering in Knowledge Representation.(BTL6)

5 a) Describe Learning Decision Trees and Evaluating and Choosing Best Hypothesis.(BTL2)
(or)
b) Explain Policy Search and Applications of Reinforcement Learning.(BTL2)

6 a) Discuss the Back Propagation Algorithm, Remarks on the Back Propagation Algorithm.(BTL6)
(or)
b) How does K-Nearest Neighbour Learning help in Instance Based Learning and also state the Importance of Radial Basis Functions. (BTL1)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (Computer Science) Programme – IV Semester

Course	CLOUD COMPUTING		
Course Code	21MCS404	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2021-22	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:

On successful completion of this course, the students:

6. Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.(CO1)
7. ApplyingconceptsofThreads,ProcessSynchronization&CUPScheduling.(CO2)
8. Understand Deadlock, Main Memory & Virtual Memory.(CO3)
9. Explain Mass Storage Structure, File System Interface & File System Implementation.(CO4)
10. Understanding on I/O Systems, Protection & Security.(CO5)

Unit	Learning Units	Lecture Hours
I	**Era of Cloud Computing :** Getting to know the cloud - Peer-To-Peer, Client- Server, and Grid Computing – Cloud computing versus Client-server Architecture - Cloud computing versus Peer-To-Peer Architecture - Cloud computing versus Grid Computing - How we got to the Cloud - Server Virtualization versus cloud computing - Components of Cloud computing – Cloud Types – Cloud Computing Service delivery Models. **Introducing Virtualization :** Introducing Virtualization and its benefits – Implementation levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms – Open Source Virtualization Technology – Binary Translation with Full Virtualization – Virtualization of CPU, Memory and I/o Devices – Hardware support for Virtualization in Index x86 Processor	12
II	**Cloud Computing Services:** Infrastructure as a Service – Platform as a Service – Language and Pass – Software as a Service – Database as a Service. **Open Source Cloud Implementation and Administration:** Open-source Eucalyptus Cloud Architecture – Open-source Open stack Cloud Architecture.	10
III	**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).	14

IV	**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 Inadequate 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.	10
V	**Application Development for cloud :** Developing On-Premise Versus Cloud Applications – Modifying Traditional Applications for Deployment in the Cloud Stages during the development process of Cloud Application - Managing a Cloud Application – Using Agile Software Development for CloudApplications 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 CloudComputing Mobile Cloud Computing Challenges.	14

Prescribed Text Book			
	Author	Title	Publisher
1	Thomas Erl, Zaigham Mahmood, Ricardo	Cloud Computing - Concepts Technology and Architecture	Pearson
2	Raj Kumar Buyya, Christen vecctiola,S Tammarai selvi	Mastering Cloud Computing, Foundations and Application Programming	TMH

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

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 21MCS404 **Title: CLOUD COMPUTING**

Time: 3Hours 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. **(5×10=50Marks)**

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 NO-SQL 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?

Criteria for Internal Assessment in Lab Courses

- There should be one internal practical lab examination for 15 marks at the end of each semester and the assessment of internal practical examination is to be done for 5 marks for ***Written Procedure***, plus 5 marks for ***Program Execution,*** plus 5 marks for ***Viva-Voce / Online Test*** in respective Laboratory Courses(papers).

Written Procedure	Program Execution	Viva Voce/Online Test	Total
A	B	C	D=(A+B+C)
5Marks	5Marks	5Marks	15Marks

- Maximum 15marks are to be awarded for practical laboratory performance basing on the average of best75% marks scored in completed lab exercises from the complete lab list. The schema for awarding these 15marks is given as under:

Schem of Continuous Internal Evaluation of Individual Student for Practical Laboratory Courses							
Course: M.Sc.,(ComputerScience)			Course Code:		Semester:	Title of Laboratory:	Total No of Exercises:
Registration Number:			Name of the Student:				
Exercise Number	Exercise Name	DateofExecution	Record (5Marks)	Execution (10Marks)	Total(15Marks)	Signature of Student	Signature of Faculty

1. Internal Assessment for Seminar Based Courses

- Internal marks for seminar are based on Seminar Report of 25Marks and End Semester ExaminationViva-voce of 25Marks.
- The time duration allotted for each student to deliver the seminaris10-20 minutes.

Seminar Report	End Semester Examination(Viva-voce)	Total
	The Viva Voice shall be conducted by a committee consisting of HOD, faculty in Charge and a senior faculty member of the department.	
A	B	(A+B)
25Marks	25Marks	50Marks

2. ExternalEvaluationof LabCourses

- The external evaluation of *practical examination* shall comprise of 10Marksfor ***LabRecord***,25Marksfor ***Written Procedure,*** 25Marksfor ***Program Execution***and10Marksfor***Viva-Voce/ Online Test***.

Evaluation Method for **External Practical** Examination				
Lab Record	Written Procedure	Program Execution	Viva Voce/ Online Test	Total
A	B	C	D	(A+B+C+D)
10Marks	25	25Marks	10Marks	70Marks

Evaluation Criteria for allocation of the 10Marks to Lab Record in External Practical Examination		
S.No.	Percentage of Lab Exercises completed in the Lab List	Marks to be Awarded
1	Above or Equalto95%	10Marks
2	Above or Equalto90 and below 95%	9Marks
3	Above or Equalto85and below 90%	8Marks
4	Above or Equalto80and below 85%	7Marks
5	Above or Equalto75and below 80%	6Marks
6	Less than 75%	5Marks

5.ProjectWorkEvaluation

- Internal assessment of Project Work will be done by the concerned *Project Internal Guide*, *Committee consisting of HOD* for100 marks.

Evaluation Schema for Continuous Internal Assessment of Project Work	
Project midterm Review and Evaluation	50Marks
Project Report/ Thesis /Record.	50Marks
Total	100Marks

- *External evaluation* and *Viva-voce* of Project Work will be carried out by *Committee Consisting of HOD, Project Supervisor* and an *External Examiner* nominated by the controller of examinations for 100Marks.

Evaluation Schema for External Project Work Assessment	
Project Report/ Thesis /Record	50Marks
End Semester Examination through Viva-voce.	50Marks
Total	100Marks

- Every faculty member must guide a minimum of five students in *Project Work* off the designated workload.

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165

(An Autonomous College in the Jurisdiction of Krishna University)Accredited

at the level 'A' by the **NAAC**

Sponsors: Siddhartha Academy of General& Technical Education

DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG (M.Sc.)

Date: 25-11-2021

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE::VUYYURU

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Accredited at the level 'A' by the NAAC
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DEPARTMENT OF COMPUTER SCIENCE (PG)

Minutes of the meeting of Board of Studies in Computer Science for M.Sc. (Computer Science) programme held on 25-11-2021 at 11:00A.M. for the Department of Computer Science.

Members Present		
Name of the Member	**Role**	**Signature**
Smt. T.Keerthi, I/C HOD, Dept. of Computer Science, A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru-521165. Mobile: 9959558485 E-Mail: keerthitatineni16@gmail.com	Chairman	
Dr. K.Madhavi, Associate Professor, Dept of Computer Science, JNTUA. College of Engineering,Anantapur. Mobile: 9440206501 E-Mail:kasamadhavi@yahoo.com	University Nominee, Krishna University	
Dr.R.Satya Prasad, Professor, Department of Computer Science, Acharya Nagarjuna University, Nagarjuna Nagar-522508. Mobile: 9848487478 E-Mail: profrsp@gmail.com	Subject Expert	
Dr.T.S.Ravi Kiran, H.O.D& Assistant Professor, Dept of Computer Science, P.B. Siddhartha Degree College of Arts & Science-Vijayawada -520002. Mobile: 9441176980 E-Mail: kirantsr1 @gmail.com	Special Invitee	
Sri.U.Sairam,C.E.O, Codegnan I.T Solutions OPC PVT LTD., Vijayawada520002 Mobile:9959555952 E-Mail: uppugundlasairam@gmail.com	Industrialist	
Ms. P.Srujana, Software Developer, TonmetriInfoSolutions,Vijayawada. Mobile: 9032671688 E-Mail:srujanapaladugu26@gmail.com	Alumni Representative	
Smt. V. Munni, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile: 8099205522 E-Mail:munni.j2ee@gmail.com	Member	
Sri.B.MadhuSudhana Rao, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile:7842664766 E-Mail:ms.madhu27@gmail.com	Member	

PG

AGENDA

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Third* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2020-2021 and onwards.

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *First* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2021-2022 and onwards.

RESOLUTIONS

- Resolved and recommended to introduce new syllabus, model papers in the Third Semester for the following courses:
  - Internet of Things (20CS3T1)
  - Cryptography & Network Security (20CS3T2)
  - Design & Analysis Algorithms (20CS3T3)
  - Data Mining techniques (20CS3T4)
  - Web Technologies LAB (20CS3L1)
  - Data Mining Lab (20CS3L2)

- To discuss and approve the *Structure*, Sy*llabi* and *Model Question Papers* of Open Electives *"Visual Analytics for Executes" and "Web Programming"* for Third Semester

- Resolved and recommended to continue the same syllabus, model papers without changes in the First Semester for the following courses:
  - Problem Solving Using Python programming (21CS1T1)
  - Computer Organization (21CS1T2)
  - Python Lab (21CS1L1)

- Resolved and recommended to introduce new syllabus, model papers in the First Semester for the following courses:
  - Software Engineering (21CS1T3)
  - Database Management System (21CS1T4)
  - Theory of Computation (21CS1T5)
  - DBMS Lab (21CS1L2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
PROBLEM SOLVING USING PYTHON PROGRAMMING	20CS1T1	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understand basics of Python Programming. (CO1)
2. Gain knowledge on *Decision Control Statements* and *Functions & Modules*. (CO2)
3. Be familiar with *Python Strings* and *Data Structures*. (CO3)
4. Have knowledge on *Classes & Objects.* (CO4)
5. Apply *Inheritance*, *Error and Exception Handling* and *Operator Overloading*. (CO5)

UNIT I

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 II

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 III

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 IV

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 V

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.

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

Reference Text Book			
	Author	Title	Publisher
1	Wesley Chun	Core Python Programming	Prentice Hall

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester
Course Code: 20CS1T1 Title: PROBLEM SOLVING USING PYTHON PROGRAMMING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**
Answer ALL questions **(10×2 = 20 Marks)**

1. a) Define *Comments* and *Operators*. (BTL1)
   b) Define *Indentation*. (BTL1)
   c) What is *Dangling else Problem?* (BTL1)
   d) What is a *Package?* (BTL1)
   e) What is a *Slice?* (BTL1)
   f) Define *Immutable*. (BTL1)
   g) What is *Class Variable* and *Instance Variable?* (BTL1)
   h) What is *Namespace?* (BTL1)
   i) Differentiate *Error* and *Exception?* (BTL3)
   j) What is *Membership Operator*. (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) Explain the features of Python Programming Language.(BTL2)

(or)

B) Explain *Different Types of Operators* in Python. (BTL2)

UNIT – II

3. A) Discuss *Basic Loop Structures* in Python with illustrations. (BTL6)

(or)

B) Explain Modules in Python with examples. (BTL2)

UNIT – III

4. A) State built-in *String Methods* and *Functions* in Python.(BTL1)

(or)

B) Explain *Tuple Data Structure* in Python with examples. (BTL2)

UNIT – IV

5. A) What are *Classes* and *Objects*? Write a program in Python to illustrate an instance variable. (BTL1)

(or)

B) Explain *Class Method* and *Static Method* with example. (BTL2)

UNIT – V

6. A) Explain *Different Types of Inheritance in Python* with suitable examples. (BTL2)

(or)

B) Explain any three *Built-in Exceptions* with relevant examples. (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTER ORGANIZATION	20CS1T2	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understand *Digital Logic Circuits*, *Digital Components and Data Representation*. (CO1)
2. Know *Register Transfer and Micro Operations* and *Basic Computer Organization and Design*. (CO2)
3. Be familiar with *Micro Programmed Control* and *Central Processing Unit*. (CO3)
4. Have knowledge on *Computer Arithmetic*. (CO4)
5. Understand *Input-Output Organization* & *Memory Organization*. (CO5)

UNIT I

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 II

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 & Control, Instruction Cycle, Memory-Reference Instructions, Input-Output Interrupt.

UNIT III

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 IV

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithm, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT V

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, Cache Memory.

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

Reference Text 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)

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester

Course Code: 20CS1T2 Title: COMPUTER ORGANIZATION

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

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

Answer ALL questions **(10×2 = 20 Marks)**

1. a) State any two *Logic Gates with Truth Tables*. (BTL1)
   b) Find the *Binary Number* $(?)_2$ to *Hexadecimal Number* $(1C)_{16}$ (BTL1)
   c) What is *Register Transfer*? (BTL1)
   d) What is *Accumulator* ? (BTL1)
   e) What is *Address Sequencing* ? (BTL1)
   f) Give details of *Stack Organization*. (BTL1)
   g) What is *BCD Adder* ? (BTL1)
   h) Perform *Binary Multiplication* for the decimal numbers 23 and 19. (BTL1)
   i) What is the difference between *Isolated* and *Memory Mapped* I/O? (BTL1)
   j) What is *Priority Interrupt* ? (BTL1)

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) What is *Flip flop*? Explain *different types of Flip flops* in detail. (BTL1)

   (OR)

   B) Explain the *Fixed Point Representation* with an example. (BTL2)

UNIT – II

3. A) Explain *Logic Micro Operations* in detail. (BTL2)

   (OR)

   B) What is *Instruction Cycle*? Explain various phases of *Instruction Cycle*. (BTL1)

UNIT – III

4. A) Describe the design of Control Unit. (BTL2)

   (OR)

   B) Explain various *Addressing Modes*. (BTL2)

UNIT – IV

5. A) What is *BCD Added* ? Explain in detail. (BTL1)

   (OR)

   B) Explain *Booth's Multiplication Algorithm* with example. (BTL2)

UNIT – V

6. A) Explain different *Modes of Data Transfers*. (BTL2)

   (OR)

   B) What is *Cache Memory*? Discuss various *Mapping Procedures* of Cache Memory. (BTL1)

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M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
SOFTWARE ENGINEERING	20CS1T3	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understand various *Software Engineering Methods*, *Practices*, *Process Models* and *Agile Development Strategies*. (CO1)
2. Illustrate *Core Principles*, *Requirements* & *Modelling Concepts*. (CO2)
3. Identify different *Software Testing Approaches* and various aspects of *Software Quality Assurance*. (CO3)
4. Classify various *Process* & *Project Management Concepts*. (CO4)
5. Estimate *Software Projects* & apply *Formal Methods Modelling*. (CO5)

UNIT I

Software and Software Engineering: The Nature of Software: Defining Software, Software Application Domains, Legacy Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practices: The Essence of Practice, General Principles, Software Myths.

Process Models: A Generic Process Model: Defining a Framework Activity, Identifying a Task Set, Process Patterns, Process Assessment and Improvement, Prescriptive Process Models:The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, A Final Word on Evolutionary Processes, Specialized Process Models: Component-Based Development, The Formal Methods Model, Aspect-Oriented Software Development, The Unified Process:A Brief History, Phases of the Unified Process, Personal and Team Process Models: Personal Software Process (PSP), Team Software Process (TSP).

Agile Development: What Is Agility, Agility and the Cost of Change, What Is an Agile Process: Agility Principles, The Politics of Agile Development, Human Factors, Extreme Programming (XP): XP Values, The XP Process, Industrial XP, The XP Debate, Other Agile Process Models: Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), Agile Unified Process (AUP).

UNIT II

Principles that Guide Practice: Core Principles: Principles That Guide Process, Principles That Guide Practice**,** Principles That Guide Each Framework Activity: Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.
Requirements Modeling: Scenarios, Information, and Analysis Classes: Requirements Analysis: Overall Objectives and Philosophy, Analysis Rules of Thumb, Domain Analysis, Requirements Modeling Approaches, Scenario-Based Modeling: Creating a Preliminary Use Case, Refining a Preliminary Use Case, Writing a Formal Use Case, UML Models That Supplement the Use Case: Developing an Activity Diagram, Swimlane Diagrams.

Data Modeling Concepts: Data Objects, Data Attributes, Relationships, Class-Based Modeling: Identifying Analysis Classes, Specifying Attributes, Defining Operations, Class-Responsibility-Collaborator (CRC) Modeling, Associations and Dependencies, Analysis Packages.

UNIT III

Software Quality Assurance: Background Issues, Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics: SQA Tasks, Goals, Attributes, and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance: A Generic Example, Six Sigma for Software Engineering, Software Reliability: Measures of Reliability and Availability, Software Safety, The ISO 9000 Quality Standards, The SQA Plan.

Software Testing Strategies: A Strategic Approach to Software Testing:Verification and Validation, Organizing for Software Testing, Software Testing Strategy-The Big Picture, Criteria for Completion of Testing, Strategic Issues, Test Strategies for Conventional Software: Unit Testing, Integration Testing, Test Strategies for Object-Oriented Software: Unit Testing in the OO Context, Integration Testing in the OO Context, Test Strategies for WebApps, Validation Testing: Validation-Test Criteria, Configuration Review, Alpha and Beta Testing, System Testing: Recovery Testing, Security Testing, Stress Testing, Performance Testing, Deployment Testing, The Art of Debugging:The Debugging Process, Psychological Considerations, Debugging Strategies, Correcting the Error

Testing Conventional Applications: Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing: Flow Graph Notation, Independent Program Paths, Deriving Test Cases, Graph Matrices, Control Structure Testing: Condition Testing, Data Flow Testing, Loop Testing, Black-Box Testing: Graph-Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing,

UNIT IV

Project Management Concepts: The Management Spectrum: The People, The Product, The Process, The Project, People: The Stakeholders, Team Leaders, The Software Team, Agile Teams, Coordination and Communication Issues, The Product:Software Scope, Problem Decomposition, The Process: Melding the Product and the Process, Process Decomposition,The Project, The W5HH Principles.

Process and Project Metrics: Metrics in the Process and Project Domains:Process Metrics and Software Process Improvement, Project Metrics, Software Measurement: Size-Oriented Metrics, Function-Oriented Metrics, Reconciling LOC and FP Metrics, Object-Oriented Metrics, Use-Case–Oriented Metrics, WebApp Project Metrics, Metrics for Software Quality: Measuring Quality, Defect Removal Efficiency.

UNIT V

Formal Modeling And Verification: The Cleanroom Strategy, Functional Specification: Black-Box Specification, State-Box Specification, Clear-Box Specification, Cleanroom Design: Design Refinement, Design Verification, Cleanroom Testing: Statistical Use Testing, Certification, Formal Methods Concepts, Applying Mathematical Notation for Formal Specification, Formal Specification Languages: Object Constraint Language (OCL), The Z Specification Language.

Estimation for Software Projects: Resources: Human Resources, Reusable Software Resources, Environmental Resources, Software Project Estimation, Decomposition Techniques: Software Sizing, Problem-Based Estimation, An Example of LOC-Based Estimation, An Example of FP-Based Estimation, Empirical Estimation Models: The Structure of Estimation Models, The COCOMO II Model, The Software Equation, Estimation for Object-Oriented Projects.

Prescribed Text Book			
	Author	Title	Publisher
1	Roger S Pressman	Software Engineering - A Practitioner's Approach	Seventh Edition, McGraw - Hill, A Business Unit of The McGraw-Hill Companies, Inc., 2010

Reference books			
	Author	Title	Publisher
1	Sommerville	Software engineering	7th edition, Pearson education
2	S.A.Kelkar	Software Engineering - A Concise Study	PHI.
3	Waman S.Jawadekar	Software Engineering	TMH.
4	AH Behforooz and Frederick J.Hudson	Software Engineering Fundamentals	Oxford (2008)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester
Course Code: 20CS1T3 Title: SOFTWARE ENGINEERING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**
Answer ALL questions **(10×2 = 20 Marks)**

1. a) Define *Software Engineering*. (BTL1)
   b) What is *PSP* & *TSP*? (BTL2)
   c) Write any two key features of *Class-Responsibility-Collaborator (CRC)* Modeling. (BTL1)
   d) State any two *Deployment Principles*. (BTL1)
   e) What is *Software Reliability*? (BTL1)
   f) Describe the *Arts of Debugging*. (BTL2)
   g) What are the aspects to be considered while testing *Object Oriented Software*? (BTL1)
   h) Write any two *W5HH Principles*. (BTL1)
   i) State various *Resources* while estimating the *Software Projects*. (BTL1)
   j) What is *State Box?* (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) What is *Myth*? State various myths of *Software Myths*. (BTL1)

(or)

B) Describe any two *Prescriptive Process Models*. (BTL2)

UNIT – II

3. A) State *(i) Communication and (ii) Planning* Principles. (BTL1)

(or)

B) Describe *Scenario-Based Modeling* in detail. (BTL2)

UNIT – III

4. A) Discuss the testing strategies to test *Conventional Software*. (BTL2)

(or)

B) What is *White Box Testing*? Explain in detail.(BTL1)

UNIT – IV

5. A) Discuss the *Management Spectrum* in detail. (BTL6)

(or)

B) Explain (i) *Size-Oriented Metrics* and (ii) *Function-Oriented Metrics* in detail.(BTL2)

UNIT – V

6. A) Explain *Functional Specification* of *Cleanroom Strategy*. (BTL2)

(or)

B) Describe *(i) The COCOMO II Model* and *(ii) The Software Equation* of Empirical Estimation Models (BTL2)

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M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
DATABASE MANAGEMENT SYSTEMS	20CS1T4	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understands the *Concepts* & *Architecture* of Databases. (CO1)
2. Able to apply simple and complex *SQL Queries* & *Relational Algebra* & *Relational Calculus* operations. (CO2)
3. Gain knowledge on *ER*, *EER Schemas* & *Normalization*. (CO3)
4. Understands *Disk Storage Organization*, *Hashing* & *Indexing*. (CO4)
5. Be aware of *Transaction Processing*, *Concurrency Control* and *Distributed Databases*. (CO5)

UNIT I

Databases and Database Users: Introduction, An Example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantage of Using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs.

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

UNIT II

Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL.

More SQL: More Complex SQL Retrieval Queries, Views (Virtual Tables) in SQL, Schema Change Statements in SQL.

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 of Queries in Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus.

UNIT III

Data Modeling Using the Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets, Attributes, Keys, Relationship Types, Relationship Sets, Roles, Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions,DesignIssues.

The Enhanced Entity-Relationship (EER) Model: Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of UNION Types Using Categories, A Sample UNIVERSITY EER Schema, Design Choices, Formal Definitions.

Functional Dependencies: Introduction, Basic Definitions, Trivial and Non-Trivial Dependencies, Closure of set of Dependencies, Closure of set of Attributes, Irreducible sets of dependencies.

Further Normalization 1NF, 2NF, 3NF, BCNF: Introduction, Nonloss decomposition and functional dependencies, 1^{st}, 2^{nd} and 3^{rd} normal forms, Boyce-Codd Normal Form. Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal.

UNIT IV

Disk Storage, Basic File Structures and Hashing: Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Files of Unordered Records (Heap Files), Files of Ordered Records (Sorted Files), Hashing Techniques, 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.

UNIT V

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, Transaction Support in SQL.

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency Control Techniques, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking, Using Locks for Concurrency Control in Indexes.

Distributed Databases: Distributed Database Concepts, Types of Distributed Database Systems, Distributed Database Architectures, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design.

Prescribed Text Book			
	Author	Title	Publisher
1	Ramez Elmasri, Shamkant B. Navathe	Fundamentals of Database Systems.	Pearson Education, Seventh Edition, 2017
2	C.J. Date, A.Kannan, S.Swamynathan	An Introduction to Database Systems	VII Edition Pearson Education (2006).

Reference Text Books			
	Author	Title	Publisher
1	Peter Rob, Carlos Coronel	Database Systems - Design, Implementation and Management	Eigth Edition, Thomson (2008)
2	Raman A Mata - Toledo, Panline K. Cushman	Database Management Systems	Schaum‟s Outlines, TMH (2007)
3	Steven Feuerstein	Oracle PL/SQL - Programming	10th Anniversary Edition, OREILLY (2008)

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester
Course Code: 20CS1T4 Title: DATABASE MANAGEMENT SYSTEMS
(w.e.f admitted batch 2020-21)

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

Answer ALL questions **(10×2 = 20 Marks)**

1. a) What is *Data Independence*? (BTL1)
   b) What is *Primary Key*? (BTL1)
   c) Write example for *Update* Command. (BTL1)
   d) What is *Join Condition*? Explain with example. (BTL1)
   e) What is *Weak Entity*? (BTL1)
   f) What is *First Normal Form*. (BTL1)
   g) What is *Heap File*. (BTL1)
   h) Write advantage of using *Multilevel Indexes*? (BTL1)
   i) Write *Properties of Transaction*. (BTL1)
   j) What is *Data Fragmentation?* (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) What is DBMS? Explain advantage of DBMS. (BTL1)

(or)

B) Explain *Three Schema Architecture* of DBMS with neat diagram. (BTL2)

UNIT – II

3. A) What is Constraint? Explain various *Constraints* of the Relational Model. (BTL1)

(or)

B) Describe *SELECT* & *PROJECT* Operations of Relational Algebra. (BTL2)

UNIT – III

4. A) What is *Generalization*? Explain with example. (BTL1)

(or)

B) What is *BCNF*? Explain with example. (BTL1)

UNIT – IV

5. A) What is Hashing? Describe *Internal* & *External* Hashing Techniques.

(or)

B) What is B-Tree? Construct B-Tree for the values 10, 20, 30, 40, 50, 60, 70, 80, 90 of order 3.

UNIT – V

6. A) Explain *Concurrency Control Based on Timestamp Ordering*. (BTL2)

(or)

B) Explain *Distributed Database Concepts* in detail. (BTL2)

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M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
THEORY OF COMPUTATION	20CS1T5	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understand *Fundamentals of Automata* and *Finite Automata*. (CO1)
2. Able to apply *Regular Languages*. (CO2)
3. Gain knowledge on *Grammar Formalism* and *Context Free Grammars*. (CO3)
4. Design *Pushdown Automata*. (CO4)
5. Understand *Turing Machine* and *Computability Theory*. (CO5)

UNIT I

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 (Simple Problems), Differences between NFA and DFA, NFA with ε Transitions- *Significance of NFA with Epsilon , Acceptance of Language*, Conversions and Equivalence-*Conversion from NFA with ε to NFA without ε, NFA to DFA Conversion, NFA with ε to DFA*, Minimization of FSM, Equivalence between two FSMs, Equivalence of Moore and Mealy Machines.

UNIT II

Regular Languages: Regular Sets, Regular Expressions, Identity Rules for Regular Expression, Conversion of Finite Automata (DFA) to Regular Expressions - *using State Elimination Method and Arden's Theorem*, Conversion of Regular Expression to ε-NFA, Pumping Lemma of Regular Languages (Sets) (Proofs Not Required).

UNIT III

Grammar Formalism: Regular Grammars - *Right Linear and Left Linear Grammars*, Inter Conversion-*Conversion of a Regular Grammar for a given Finite Automata, Construct FA from Regular Grammar*, 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), Simple Problems.

UNIT IV

Push Down Automata: Definition, Model, Design of PDA, Acceptance by Final State and Acceptance by Empty Stack, Inter Conversion - *Construct PDA Equivalent to a given CFL, Construct CFL Equivalent to a given PDA* (Proofs Not Required).

UNIT V

Turing Machine: Definition, Model, Design of TM, Recursively Enumerable Languages and its Properties and Recursive Languages, Types of Turning Machines: Simple Problems.

Computability Theory: Chomsky Hierarchy of Languages: *Regular Grammars, Unrestricted Grammars, Context Sensitive Languages*, Decidability of Problems: *Properties of Recursive and Recursively Enumerable Languages*, Universal Turing Machine**,** Undecidability of Posts Correspondence Problem, Definition of NP Complete and NP Hard Problems.

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

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

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M.Sc., (Computer Science) Programme - I Semester

Course Code: 20CS1T5 Title: THEORY OF COMPUTATION

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

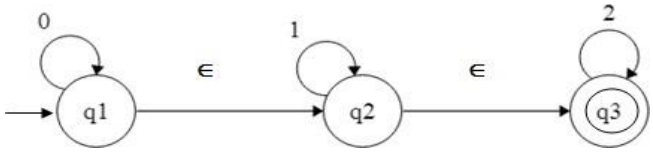
Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10×2 = 20 Marks)**

1.

a) Define Alphabet. (BTL1)

b) Find ε-closure of all states for the given *Transition Diagram*. (BTL1)



c) Define *Regular Expression* and *Regular Set* with example (BTL1)

d) Write *Regular Expression* which denotes a language L over the set ∑={0} having even length of string. (BTL1)

e) Define *Parse Tree* with example. (BTL1)

f) Show that the grammar is ambiguous (BTL2)

S → a | sA | | bSS | | SSb | | SbS |

g) Give the formal definition of *Push Down Automata*. (BTL1)

h) Define *Deterministic PDA*. (BTL1)

i) What are Recursively Enumerable Languages? (BTL1)

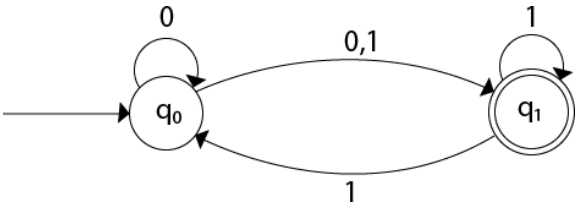
j) Define *Turing Machine*. (BTL1)

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

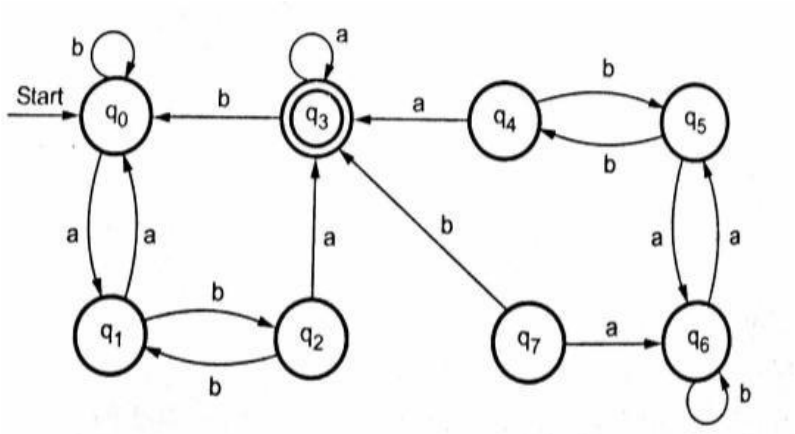
UNIT – I

2. A) Convert the given NFA to DFA. (BTL3)



(OR)

B) Construct the minimum DFA for the following *Transition Diagram.* (BTL3)

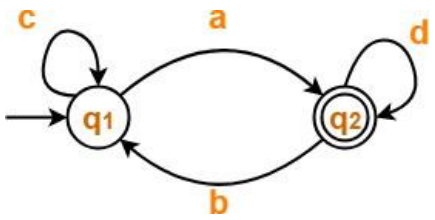


UNIT – II

3. A) Construct epsilon NFA for *Regular Expression* 1+00+010* (BTL3)

(OR)

B) Find *Regular Expression* for the following *DFA* using *State Elimination Method.* (BTL1)



UNIT – III

4. A) Drive the string "aabbabba" for *Leftmost Derivation* and *Rightmost Derivation* using a CFG given by (BTL5)

S → aB | bA
A → a | aS | bAA
B → b | bS | aBB

(OR)

B) For the following grammar, construct CNF (BTL3)

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* (BTL3)

   $S \rightarrow AA \mid a$

   $A \rightarrow SA \mid b$

(OR)

B) The PDA is as given below

$A = (\{q_0, q_1\}, \{0,1\}, \{S,A\}, \delta, q_0, S, \emptyset)$

Where δ is as given below

$\delta(q_0, 1, S) = \{(q_0, AS)\}$

$\delta(q_0, \varepsilon, S) = \{(q_0, \varepsilon)\}$

$\delta(q_0, 1, A) = \{(q_0, AA)\}$

$\delta(q_0, 0, A) = \{(q_1, A)\}$

$\delta(q_0, 1, A) = \{(q_1, \varepsilon)\}$

$\delta(q_0, 0, S) = \{(q_0, S)\}$

Construct the CFG equivalent to this PDA. (BTL3)

UNIT – V

6. A) Design a *Turing Machine* for the Language $L=\{a^n b^n c^n | n >= 1\}$ (BTL6)

(OR)

B) Define PCP and also find the correspondence system as given below

A = (1,0,010,11) and B = (10,10,01,1) the input set is $\sum=\{0,1\}$ find the solution. (BTL1)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	20CS1L1	-	-	8	4	2020-21

Course Outcomes:

On successful completion of this course, the students:

1. Understand basics of *Python Programming*. (CO1)
2. Gain knowledge on *Decision Control Statements* and *Functions & Modules*. (CO2)
3. Be familiar with *Python Strings* and *Data Structures*. (CO3)
4. Apply *Inheritance*, *Error and Exception Handling* and *Operator Overloading*. (CO4)
5. Able to connect Database and perform Database Access. (CO5)

1. Write a python program to enter a number and display its hex and octal equivalent and its square root.
2. WAP to read and print values of variables of different data types.
3. WAP a. To calculate area of a triangle using herons formula.
   b. To calculate the distance between two points.
   c. To calculate the area of the circle.
4. WAP to perform addition, subtraction, multiplication, division, integer division, and modulo division on two integer numbers.
5. WAP to calculate the total amount of money in the piggybank, given the coins of Rs10,Rs 5, Rs 2 and Rs1.
6. WAP to calculate the bill amount for an item given its quantity sold, value, discount and tax.
7. WAP to calculate a students result based on two examinations,1sports event and 3 activities conducted. The weightage of activities=30 percent, sports=20 percent and examination=50 percent.
8. WAP to convert a floating point number into the corresponding integer.
9. A company decides to give bonus to all its employees on diwali. 5% bonus on salary is given to the male workers and 10% bonus on salary to the female workers.WAP to enter the salary of the employee and gender of the employee gets an extra2% bonus on salary .Calculate the bonus that has to be given to the employee and display the salary that the employee will get.
10. WAP to calculate tax given the following conditions:

    If income is less than 1,50.000 then no tax

    If taxable income is 1,50,001 – 300,000 then charge 20% tax

    If taxable income is above 5,00,001 then charge 30% tax

    MIN1 = 150001

    MAX1= 300000

    RATE1 = 0.10

MIN2 = 300001

MAX2=500000

RATE2=0.20

MIN3=500001

RATE3=0.30

11. WAP to calculate the roots of quadratic equation.
12. WAP to make a simple calculator.
13. WAP to print the calendar of any given year.
14. WAP to calculate simple interest .suppose the customer is a senior citizen. He is being offered 12% interest for all customers the ROI is 10% using functions.
15. WAP to display the date and time using the time module.
16. Write a python program to perform inheritance.
17. Write a Python program to perform exception handling.
18. WAP to demonstrate slice operation on string objects.
19. a. WAP to calculate fib(n) using a dictionary.
    b. to create a dictionary cubes of odd numbers in the range 1 to 10.
20. WAP to parse an emailed to print from which email server it was sent and when.
21. WAP to perform operations on stack.
22. WAP to perform read and write operations in files.
23. WAP that accepts filename as an input from an user open a file count a number of times a character appears in the file.
24. Write a program on modules.
25. Write a program to perform image operations.
26. Write a GUI for an expression calculator using tk.
27. Write a program to print text from the audio file. (Speech to Text and using speech_recognization library).
28. Write a program to connect database and create a table using SQLite.
29. Write a program to perform insertion and selection operation using SQLite.

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
DBMS LAB	20CS1L2	-	-	8	4	2020-21

Course Outcomes:

1. Create Database using DDL Commands. (CO1)
2. Retrieve Data from database using DML for a given situation. (CO2)
3. Familiarize with a Query Language through basic SQL Queries. (CO3)
4. Experiment Nested Query, Joins, Integrity Constraints and Views in database. (CO4)
5. Demonstrate Trigger, Function and Procedure using PL/SQL. (CO5)

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
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
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”,

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,2018.

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)

Solve the following queries by using above tables.
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 pairs 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

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)

Solve the following queries by using above tables.
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).

CYCLE-IV

An Airline system would like to keep track their information by using the following relations.

FLIGHTS(fl_no: integer, from: string, to: string, distance: integer, price: integer)
AIRCRAFT(aid: integer, aname: string, cruising_range: integer)
CERTIFIED(eid: integer, aid: integer)
Employees(eid: integer, ename: string, salary: real)

Note that the employees relation describes pilots and other kinds of employees as well; every pilot is certified for aircraft and only pilots are certified to fly. Resolve the following queries.

a) Find the names of pilots whose salary is less than the price of the cheapest route from Newyork to Chicago.
b) For each pilot who is certified for more than 2 aircraft, find the eid‟s and the maximum cruising range of the aircraft that he or she certified for.
c) For all aircraft with cruising range over 1,500 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
d) Find the aid‟s of all aircraft than can be used from chicaga to LosAngels.
e) Find the name of the pilots certified from some Boeing aircraft.
f) Print the enames of pilots who can operate planes with cruising range greater than 3,500 miles, but are not certified by Boeing aircraft.
g) Find the eid‟s of employees who are certified for exactly 2 aircrafts.
h) Find the total amount paid to employees as salaries.
i) Find the aid‟s of all than can be used on non-stop flights from Chennai to Dubai.
j) Find the eid‟s of employee who make second highest salary.

PL/SQL PROGRAMS

1. Write a PL/SQL program to check the given number is strong or not.
2. Write a PL/SQL program to check the given string is palindrome or not.
3. Write a PL/SQL program to swap two numbers without using third variable.
4. Writ a PL/SQL program to generate multiplication tables for 2, 4, 6.
5. Write a PL/SQL program to check the given number is Amstrong or not.
6. Write a PL/SQL code to find the factorial of any number.
7. Write a PL/SQL program to display sum of even numbers and sum of odd numbers in the given range.
8. Write a PL/SQL program to check the given number is palindrome or not.
9. The HRD manager has decide to raise the employee salary by 15% write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in Emp table.
10. Write a PL/SQL program to display to 10 rows in Emp table based on their job and salary.
11. Write a PL/SQL program to raise the employee salary by 10% for department number 30 people and also maintain the raised details in the raise table.
12. Write a procedure to update the salary of Employee, who are not getting commission by 10%.
13. Write a PL/SQL procedure to prepare an electricity bill by using following table.

Table used: Elect

Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_ UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_ TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

14. Write a PL/SQL program to prepare an telephone bill by using following table and print the monthly bills for each customer.

Table used: Phone		
Name	Null?	Type
TEL_NO	NOT NULL	NUMBER(6)
CNAME		VARCHAR2(20)
CITY		VARCHAR2(10)
PR_READ		NUMBER(5)
CUR_READ		NUMBER(5)
NET_AMT		NUMBER(5)
TOT-AMT		NUMBER(8,2)

15. Write a PL/SQL program to raise the employee salary by 10 %, who are completed ther 25 years of service and store the details at appropriate tables (Define the Retair_ Emp_Table) .
16. Write a PL/SQL program to evaluate the grade of a student with following conditions:
    For pass: all marks > 40
    For I class: Total % > 59
    For II Class: Total % between >40 and < 60
    For III class: total % = 40
    And also maintain the details in abstract table.

1. Table Std		
Name	Null?	Type
NO	NOT NULL	NUMBER
NAME		VARCHAR2(10)
INTNO		NUMBER
CLASS	NOT NULL	VARCHAR2(10)
M1		NUMBER
M2		NUMBER
M3		NUMBER
M4		NUMBER
M5		NUMBER

2. Table Abstract		
Name	Null?	Type
STDNO		NUMBER
STDNAME		VARCHAR2(10)
CLASS		VARCHAR2(10)
MONTH		VARCHAR2(10)
INTNO (INTEGER NUMBER)		NUMBER
TOT		NUMBER
GRADE		VARCHAR2(10)
PERCENT		NUMBER
DAT_ENTER		DATE

Appendix-II
Third Semester *Structure, Syllabus* & *Model Question Papers* of M.Sc.(Computer Science) Programme.
(For the batch of Students admitted during the Academic Year 2020-2021)

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165
(An Autonomous College in the jurisdiction of Krishna University)
NAAC reaccredited at 'A' level

Programme: M.Sc.(Computer Science)

Title of the Paper: Internet of Things

Semester: III

Course Code	20CS3T1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2021-22	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective: To understand and gain knowledge on *Over View* of *Internet of Things*, *Models*, *Layers* & S*tandardization, Protocols* & *Design Principles* for Connected Devices, *Internet Connectivity Principles, Protocols* & *Application Layer Protocols*, *Data Acquiring*, *Business Models* and *Business Processes*.

Course Outcomes: On successful completion of the course student will be able to:

CO1: Attain knowledge over view of *Internet of Things*.

CO2: Understand *Models*, *Layers* & *Standardization*.

CO3: Apply *Protocols* & *Design Principles* for Connected Devices.

CO4: Understand *Internet Connectivity Principles*, *Protocols* & Application Layer Protocols.

CO5: Understand *Data Acquiring*, *Business Models* and *Business Processes*.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**The Internet of Things:** An Overview of Internet of Things, Internet of Things Technology, Behind IoT Sources of the IoT, M2M Communication, Examples of IoT, Design Principles for Connected Devices, Business Models for Business Processes in the Internet of Things.	12
II	**Design Principles for Connected Devices:** IoT / M2M systems layers and Designs Standardizations, Modified OSI Stack for the IoT / M2M Systems, ETSI M2M Domains and High-level Capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway ease of Designing and Affordability.	12
III	**Design Principles for the Web Connectivity:** Design Principles for the Web Connectivity for Connected Devices, Web Communication Protocols for Connected Devices, Message Communication Protocols for Connected Devices, Web Connectivity for Connected Devices.	12
IV	**Internet Connectivity Principles:** Introduction, Internet Connectivity, Application Layer Protocols: *HTTP, HTTPS, FTP, Telnet.*	12
V	**Data Acquiring, Organizing and Analytics in IoT / M2M**: Introduction, Applications / Services / Business Processes, IOT / M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.	12

Prescribed Text Book			
	Author	Title	Publisher
1	Rajkamal	Internet of Things: Architecture, Design Principles and Applications	McGraw Hill Higher Education

Reference Text Book			
	Author	Title	Publisher
1	Adrian McEwen and Hakim Cassimally	Designing the Internet of Things	Wiley
2	CunoPfister	Getting Started with the Internet of Things.	Oreilly

Course Focus: Employability

Websites of Interest:

1. https://dzone.com/iot-developer-tutorials-tools-news-reviews
2. https://www.ibm.com/blogs/internet-of-things/

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - III Semester

Course Code: 20CS3T1 **Title: Internet of Things (IoT)**

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

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

Answer ALL questions **(10×2 = 20 Marks)**

7. a) What is *M2M Communication*. (BTL1)
   b) What are *Connected Devices*? (BTL1)
   c) Write about *modified ISO*. (BTL1)
   d) What is a *Gateway?* (BTL1)
   e) What is *Communication Protocol*? (BTL1)
   f) What is *Resource and Resource Repository?*(BTL1)
   g) What is *Header? Explain TCP Header.*(BTL1)
   h) What is *Protocol Data Unit and Maximum Transferable Unit.* (BTL1)
   i) Write about *Event Data.*(BTL1)
   j) What are *Active* and *Passive Devices?*(BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. a) Explain an overview of IOT. (BTL2)

(or)

b) Explain *implementation of IOT in Smart Cities*. (BTL2)

UNIT – II

3. a) Explain various *Layers* & *Design Standardization Principles* of IOT. (BTL2)

(or)

b) Explain different *communication technologies* used in IOT. (BTL2)

UNIT – III

4. a) What are *Web Communication Protocols* for Connected Devices? (BTL1)

(or)

b) What are various *Design Principles* for the Web Connectivity? (BTL1)

UNIT – IV

5. a) Explain in detail *Internet Connectivity Principles*. (BTL5)

(or)

b) Explain any two *Application Layer Protocols.* (BTL5)

UNIT – V

6. a) Illustrate *Business Models* for *Business Processes* in the Internet of Things. (BTL2)

(or)

b) Explain *Integration* and *Enterprise* Systems. (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme: M.Sc.(Computer Science)

Title of the Paper: Cryptography & Network Security

Semester: III

Course Code	20CS3T2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision: 10

Course Objective: To understand and gain knowledge on *Computer & Network Security, Number Theory, Classical Encryption Techniques, Advanced Encryption Standard and Random Bit Generation and Stream Ciphers, Number Theory, Public Key Cryptography and RSA, Other Public-Key Crypto Systems and Message Authentication Codes, Digital Signatures, Key Management and Distribution* and *User Authentication, Transport Level Security, Electronic Mail Security and IP Security* and *Intruders and Firewalls*.

Course Outcomes: On successful completion of this course, the students will be able to:

CO1 : Understand *Computer & Network Security Concepts, Classical Encryption Techniques and Advanced Encryption Standard.*

CO2 : Gain knowledge on *Number Theory, Public Key Cryptography and RSA, Other Public-Key Crypto Systems* and *Message Authentication Codes*.

CO3 : Know *Digital Signatures, Key Management and Distribution* and *User Authentication.*

CO4 : Understand *Transport Level Security, Electronic Mail Security* and *IP Security*.

CO5 : Gain knowledge about *Intruders and Firewalls.*

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Computer & Network Security Concepts:** Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques **Advanced Encryption Standard:** AES Structure, An AES Example, AES Implementation. Random Bit Generation and Stream Ciphers: Principles of Pseudo Random Number Generation, Pseudo Random Number Generators.	12
II	**Introduction to Number Theory:** Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat‟s and Euler‟s Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. **Public Key Cryptography and RSA:** Principles of Public Key Crypto Systems, The RSA Algorithm. **Other Public-Key Crypto Systems:** Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. **Message Authentication Codes:** Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC.	12
III	**Digital Signatures:** Digital Signatures, NIST Digital Signature Algorithm. **Key Management and Distribution:** Symmetric Key Distribution Using Asymmetric Encryption,Distribution of Public Keys. **User Authentication:** Kerberos, Remote User-Authentication Using Asymmetric Encryption.	12
IV	**Transport Level Security:** Transport Layer Security. **Electronic Mail Security:** S/MIME, Pretty Good Privacy. **IP Security:** IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining SecurityAssociations.	12
V	**Intruders:** Intruders, Intrusion Detection, Password Management. **Firewalls:** The Need for Firewalls, Firewall Characteristics and Access Policy, Types of Firewalls.	12

Prescribed Text Book			
	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Seventh Edition, 2017

Reference Text Book			
	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Sixth Edition, 2014
2	William Stallings	Network Security Essentials-Applications and Standards	Pearson Education (2007), Third Edition.
3	Chris McNab	Network Security Assessment	OReilly (2007), 2nd Edition
4	Jon Erickson	Hacking-The Art of Exploitation	Press (2006),SPD
5	Neal Krawety	Introduction to Network Security	Thomson (2007).
6	Ankit Fadia	Network Security-AHackers Perspective	Macmillan (2008)
7	Behrouz A Forouzan, Debdeep Mukhopadhyay	Cryptography and Network Security	MCGraw-Hill, Indian Special Edition, Third Edition, 2015

Course has focus on : Employability

Websites of Interest :

1. https://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighere d/preface/0132775069.pdf
2. http://faculty.mu.edu.sa/public/uploads/1360993259.0858Cryptography%20and%20Network%20Security%20Principles%20and%20Practice,%205th %20Edition.pd

Co-curricular Activities : Programming Contests, Hackathons & Quiz.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (Computer Science) Programme - III Semester
Course Code: 20CS3T2 Title: CRYPTOGRAPHY & NETWORK SECURITY
(w.e.f admitted batch 2020-21)

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

Answer ALL questions **(10×2 = 20 Marks)**

1) a) What is *Caesar Cipher*? (BTL1)
   b) Write any two characteristics of Randomness. (BTL1)
   c) What is the Purpose of the *Euclidean Algorithm*? (BTL1)
   d) What is Message Encryption? (BTL1)
   e) What is the difference between *Symmetric Key Distribution* & *Asymmetric Key Distribution*? (BTL1)
   f) What is *Mutual Authentication?* (BTL1)
   g) State any two Protocols of *Transport Layer Security*. (BTL1)
   h) What is *Pretty Good Privacy?* (BTL1)
   i) What is *Firewall?* (BTL1)
   j) State any two *Intrusion Detection Techniques*. (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT- I

2) a) Explain various *Security Attacks* and *Security Services*. (BTL2) 10 Marks

(or)

b) Explain *AES Encryption* and *Decryption* Process. (BTL2) 10 Marks

UNIT- II

3) a) Illustrate *Diffie-Hellman Key Exchange*. (BTL2) 10 Marks

(or)

b) Explain *Internal and External Error Control* in Message Authentication Functions. (BTL2) 10 Marks

UNIT-III

4) a) Explain *NIST Digital Signature Algorithm* with diagram. (BTL5) 10 Marks

(or)

b) Explain *Kerberos* in detail. (BTL5) 10 Marks

UNIT-IV

5) a) Explain *Confidentiality* and *Authentication* in S/MIME. (BTL5) 10 Marks

(or)

b) Illustrate *Overview of IP Security*. (BTL5) 10 Marks

UNIT-V

6) a) Discuss what are the problems that may intruder create and explain how to overcome those problem? (BTL6) 10 Marks

(or)

b) Discuss *Various Types of Firewalls*. (BTL6) 10 Marks

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme: M.Sc.(Computer Science)

Title of the Paper: Design & Analysis of Algorithms

Semester: III

Course Code	20CS3T3	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision:Nil

Course Objective: The objective of this course is to develop proficiency in *Problem Solving and Programming*, To *Perform Analysis of various Algorithms in regard to Time and Space Complexity*, Gain *good understanding of Applications of Data Structures*, To develop a base for *Advanced Study* in *Computer Science*, To apply *Design Techniques* to solve different types of problems as per their *Complexity* and Develop *ability to segregate NP-Hard and NP-Complete problems.*

Course Outcomes: On successful completion of this course, the students will be able to:

CO1 : Understand *Basic Ideas* about *Analysis of Algorithms and the Concept of Data Structures*.

CO2 : Know *Divide and Conquer ,Greedy Methods* and *Solving Various Problems* by applying them.

CO3 : Apply *Dynamic Programming Method* and *Basic Traversal and Search Techniques* to solve various Problems.

CO4 : Understand *Backtracking* and *Branch and Bound* Techniques to Design Algorithms.

CO5 : Categorize *NP-Hard* and *NP-Complete* Problems.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Algorithm, Algorithm Specification Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity Time Complexity, Asymptotic Notation, Performance Measurement, Randomized Algorithms: Basics of Probability Theory, Randomized Algorithms Identifying the Repeated Element, Primality Testing: Advantages and Disadvantages. **Elementary Data Structures:** Stacks and Queues, Trees: Terminology, Binary Trees, Dictionaries: Binary Search Trees, Priority Queues, Heaps , Heapsort , Sets and Disjoint Set Union: Introduction-Union and Find Operations, Graphs: Introduction, Definitions, Graph Representations.	10
II	**Divide-and-Conquer:** General Method, Defective Chess Board, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort, Selection Problem, Strassen's Matrix Multiplication, Convex Hull: Some Geometric Primitives, The Quick Hull Algorithm, Graham's Scan, An O(nlogn) Divide and Conquer Algorithm. **The Greedy Method:** The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.	14
III	**Dynamic Programming:** The General Method, Multi Stage Graphs, All Pairs Shortest Paths, Single Source Shortest Paths, Optimal Binary Search Trees, String Editing -0/1 Knapsack, Reliability Design, The Traveling Sales 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.	17
IV	**Backtracking:** The General Method, The 8-Queens Problem, Sum of Subsets, 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.	11
V	**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 Scheduling, NP-Hard Code Generation Problems, Code Generation With Common Sub Expressions, Implementing Parallel Assignment Instructions, Some Simplified NP-Hard Problems.	8

Prescribed Text Book			
S.No	Author	Title	Publisher
1	Sartaj Sahni	Fundamentals of Computer Algorithms	Second Edition, Universities Press (2008)

Reference Text Books			
S.No.	Author	Title	Publisher
1	Anany Levitin	Introduction to the Design & Analysis of	Second Edition, Pearson
2	I.Chandra Mohan	Design and Analysis of Algorithms	PHI
3	Prabhakar Gupta, Vineet Agrawal	Design and Analysis of Algorithms	PHI
4	Parag Himanshu, Dave	Design and Analysis of Algorithms	Pearson Education (2008)

Course Focus: Foundation / **S**kill Development.

Reference Websites :

1. https://epgp.inflibnet.ac.in/Home
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/lecture-notes/
3. https://www.cukashmir.ac.in/cukashmir/User_Files/imagefile/DIT/StudyMaterial/DAA/DAA_UNIT-I_6th-Sem_StudyMaterial.pdf

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc.(Computer Science) Programme - III Semester

Course Code: 20CS3T3 Title: DESIGN AND ANALYSIS OF ALGORITHMS
(w.e.f admitted batch 2020-21)

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

Answer ALL questions **(10×2 = 20 Marks)**

1. a) Define *Algorithm.* (BTL1)
   b) What is a *priority queue*? (BTL1)
   c) Define *Convex Hull.* (BTL1)
   d) What is *tree vertex splitting?* (BTL1)
   e) What is *String Editing ?* (BTL1)
   f) Differentiate *DFS and BFS.* (BTL1)
   g)What is *Graph colouring?* (BTL1)
   h) What is *LC and FIFO Branch and Bound?*(BTL1)
   i) Compare *NP hard and NP complete classes.* (BTL1)
   j) What is *flow shop scheduling* in *NP Hard Scheduling problems?* (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) Explain *Asymptotic Notations* regarding time and space complexities of an algorithm.(BTL2)

(or)

B) Explain in detail about *Heap Sort Technique* with an example.(BTL2)

UNIT – II

3. A) What is *Divide and Conquer approach? A*pply it on *Quick Sort* with an example. (BTL2)

(or)

B) What is *Greedy method*? Explain *Kruskal's Algorithm* to find *minimum cost spanning tree* with an example. (BTL2)

UNIT – III

4. A) Explain the application of Dynamic Programming on Travelling Salesman Problem.(BTL2)

(or)

B) Explain the procedure to obtain Optimal Binary Search Tree by applying Dynamic Programming approach. (BTL2)

UNIT – IV

5. A) What is 0/1-Knapsack Problem ? Solve it using Branch and Bound technique. (BTL2)

(or)

B) Explain the Sum of Subsets Problem. How can it be solved using Back Tracking Technique? (BTL2)

UNIT – V

6. A) Write *Cook's theorem*. Briefly explain *Cook's theorem.* (BTL2)

(or)

B) Discuss various *NP Hard Graph Problems.* (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme: M.Sc. (Computer Science)

Title of the Paper: Data Mining Techniques

Semester: III

Course Code	20CS3T4	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision:Nil

Course Objective:

To understand and gain knowledge on *Basic Concepts*, *Applications*, Techniques of Data Mining, *Data Warehouse Architecture* and its *Components*, *Schemas*, *Different OLAP Operations*, *Characterize The Kinds of Patterns that can be discovered by Association Rule Mining*, *Data Classification and Prediction Techniques, Identify the Similarities among the data Using Clustering Algorithms* and *Outlier Analysis*.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Understand the *Basics of Data Mining* and *Data Pre-Processing Techniques*.

CO2: Aware of constructing the *Data Warehouse*, OLAP and relevant *Data Model Concepts*.

CO3: Understand the *Frequent Itemset Mining Methods* and Different Levels in Association Rules.

CO4: Understand the *Basic Concepts in Classification* and *Advanced Classification Methods* by implementing *Various Algorithms*.

CO5: Find the similarities among the data using *Clustering Algorithms* and *Outlier Analysis*.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Data mining?, What Kind of Data can be Mined, What kinds of Patterns can be Mined, Major Issues in Data Mining**.** **Data Preprocessing:** Data Preprocessing : An Overview, Data Cleaning, Data Integration, Data Reduction-Overview of Data Reduction Strategies, Attribute Subset Selection, Regression and Log Linear Models, Histograms and Clustering, Data Transformation : Data Transformation Strategies Overview, Data Transformation by Normalisation, Discretization by Binning.	12
II	**Data Warehousing and OLAP:** Data Warehouse : Basic Concepts, What Is a Data Warehouse?, Difference between Operational Database Systems and Data Warehouses, Why have a separate Data Warehouse?, Data Warehousing : A Multiered Architecture, Data Warehouse Models, Extraction, Transformation and Loading, Metadata Repository, Data Warehouse Modeling : Data Cube and OLAP-A Multidimensional Data Mode-From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes and Fact Constellations : Schemas for Multidimensional Data Models , Dimensions : The Role of Concept Hierarchies, Measures: their categorisation and computation, Typical OLAP Operations in the Multidimensional Data Model, A Starnet Query Model for Querying Multidimensional Databases.	12
III	**Mining Frequent Patterns, Associations:** Basic Concept, Market Basket Analysis : A Motivational Example, Frequent Item Sets, Closed Item Sets and Association Rules, Frequent Item Set Mining Methods. **Advanced Pattern Mining:** Pattern Mining : A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Mining Multilevel Association Rules, Mining Multi Dimensional Associations, Mining Quantitative Association Rules.	12
IV	**Classification: Basic Concepts:** What is Classification?, General Approaches to Classification, Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Bayes Classification Methods, Bayes Theorem, Navie Bayesian Classification. **Classification: Advanced Methods:** Bayesian Belief Networks, Concepts and Mechanisms, Training Bayesian Belief Networks, Classification by Back Propagation.	12
V	**Cluster Analysis Introduction:** What is Cluster Analysis?, Requirements for Cluster Analysis, A Partitioning Methods : K-Means, K-Medoid, Hierarchical Methods : Agglomerative versus Divisive Hierarchical Clustering, Distance Measures in Algorithmic Methods, BRICH : Multiphase Hierarchical Clustering using Clustering Feature Trees, Chameleon Hierarchical Clustering, Density Based Methods : DBSCAN. **Outlier Detection:** What is Outliers Analysis?, Types of Outliers, Challenges of Outlier Detection.	12

Text Books			
	Author	Title	Publisher
1	Jiawei Han, Micheline Kamber	Data mining : Concepts & Techniques	Morgan Kaufmann 3rd Edition Chapter-1 1.2,1.3,1.4,1.7 Chapter-3 3.1,3.2,3.3,3.4(3.4.1,3.4.4,3.4.5,3.4.6,3.4.7) Chapter-4 4.1 to 4.2 Chapter-6 6.1 to 6.2 Chapter-7 7.1,7.2(7.2.1 to7.2.3) Chapter-8 8.1,8.2(8.2.1,8.2.2,8.2.3,8.2.4),8.3 Chapter-9 9.1 to 9.2 Chapter-10 10.1,10.2,10.3(10.3.1,10.3.2,10.3.3,10.3.4),10.4(10.4.1) Chapter-12 12.1(12.1.1,12.1.2,12.1.3)

Reference Books			
	Author	Title	Publisher
1	Ralph Kimball	The Data Warehousing Toolkit	Wiley
2	S.N.Sivanandam, S.Sumathi	Data Mining-Concepts, Tasks and Techniques	Thomson

Websites of Interest:

1. www- db.standford.edu /`ullman/mining/mining.html : Data mining lecture notes.
2. ocw.mit.edu/ocwweb/slon-School-of-management/15-062Data-Mining Spring2003/course

Course Focus: Foundation **/ E**mployability / **S**kill Development.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - III Semester
Course Code: 20CS3T4 Title: DATA MINING TECHNIQUES
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**
Answer ALL questions **(10×2 = 20 Marks)**

1. a) Difference between *Data Mining* and *KDD* (BTL4)
   b) What is meant by *Data Preprocessing*? (BTL1)
   c) Define *Multidimensional Data model*. (BTL1)
   d) OLAP versus OLTP (BTL4)
   e) Give one example for *Closed Itemset* and *Maximal Frequent Itemset* (BTL1)
   f) What is meant by *Association Rule*? (BTL1)
   g) Explain *Bayes Theorem.* (BTL2)
   h) Define *Classification* with Example. (BTL1)
   i) What are the requirements of *Cluster Analysis*? (BTL1)
   j) What is meant by *Outliers*? (BTL1)

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

2. A) Define Data Mining. What kinds of Patterns can be mined in *Data Mining*. 10M (BTL1)

   (or)

   B) Define *Data Integration*. What are the *Different Techniques used in Data Integration*. 10M (BTL1)

UNIT – II

3. A) Define *Data Warehouse*. Explain *Data Warehouse Architecture* with neat Diagram. 10M (BTL1)

   (or)

   B) What are the different types of *Schemas* used in *Multi Dimensional Data Model*? 10M (BTL1)

UNIT – III

4. A) Explain *Aprior Algorithm* with Example. 10M (BTL2)

   (or)

   B) Explain *Multi Level and Multi Dimensional Association Rules* with Examples. 10M (BTL2)

UNIT – IV

5. A) Explain *Decision Tree Induction Algorithm* with Example. 10M (BTL5)

   (or)

   B) Explain *Naïve Bayes Classification* with Example. 10M (BTL5)

UNIT – V

6. A) Explain *Different Partitioning Methods* used in *Cluster Analysis*. 10M (BTL2)

   (or)

   B) Explain in detail about *Hierarchical Clustering*.10M (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme: M.Sc.(Computer Science)

Title of the Paper: Web Technologies Lab

Semester: III

Course Code	20CS3L1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam Marks	70
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision: 0%

Course Objective: Able to build functional *Web Applications using HTML*, Able to use *JavaScript and DHTML* for *Web Designing*, Able to code using XML and PHP for *Integrating with Web Pages*, *Create Dynamic Web Pages* where in client interaction is facilitated using advanced server technology like *JSP* and *Web Pages* with *Database Connectivity using PHP*.

Course Outcomes: On successful completion of the course student will be able to:

CO1: Build functional *Web Applications HTML*.

CO2: Incorporates *Multimedia Capabilities* and *Web Page Designs* using *Cascading Style Sheets*.

CO3: Code *Client Server Interaction Programs* using *Java Based Server Technology* named *Servlets*.

CO4: Create *Dynamic Web Pages* where in *Client Interaction* is facilitated using Advanced Server Technology like *JSP*.

CO5: Integrate *Offline Data Storage*, *Background Processes* and APIs using *Database Connectivity* and *ASP*.

Syllabus

Course Details

HTML:

1. Develop HTML code to provide intra document linking. (BTL6)
2. Develop HTML code to provide inter document linking. (BTL6)

3. Develop a program to implement the three types of lists. (BTL6)
4. Create a HTML page using frames. (BTL6)
5. Develop a program to embed college picture into your web page and develop a short note on your college using paragraph tag. (BTL6)

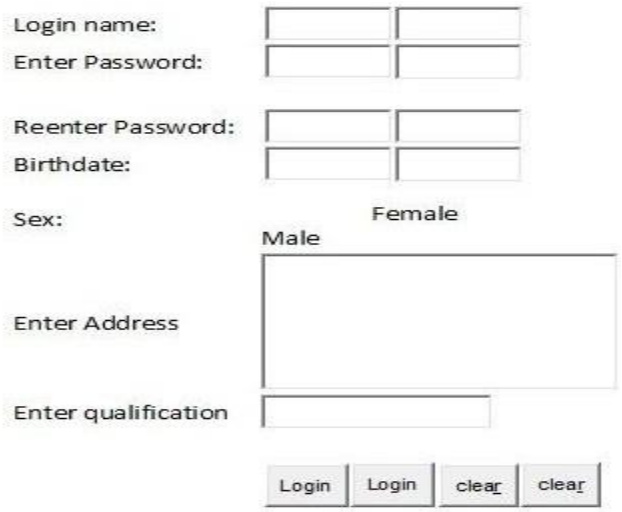
6. Illustrate a suitable example; depict how we can align text using a table tag as follows. (BTL2)

II M.C.A	Pass percenetage=95%
	Fail percentage=5%
III M.C.A	Pass percenetage=97%
	Fail percentage=3%

7. Develop a program to create the time table as follows: (BTL6)

	1	2	3		4	5	6
MON	<------WEB LAB------>				SE	WEB	PPL
TUE	UML	CRY	SE	B	<-------VB LAB------->		
WED	WEB	SE	UML	R	CRY	PPL	
THU	CRY	WEB	PPL	E	<------WEB LAB------>		
FRI	<-------VB LAB------->			A	PPL	WEB	UML
SAT	SE	CRY	UML	K	<------SEMINARS------>		

8. Create a Registration form that interacts with the user. Collect login name, password, date of birth,sex, address, qualification and display a "Thank you for registering" message when the user submits the form. (BTL6)



Java Script:

9. Develop a script to compare two strings using String object. (BTL6)
10. Develop a script to generate random numbers within 1 to 10 and display the numbers in a table. (BTL6)
11. Develop a Java Script to update the information into the array, in the "onClick" event of the button "Update". (BTL6)
12. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill with the total being added up simultaneously. (BTL6)

Item details	Price of item	Click here to select
	8399	☐
	5000	☑
	450	☑
	399	☐
YOUR TOTAL BILL IS 5450		

13. Develop a script to find the duplicate elements of an array. (BTL6)
14. Develop a script which generates a different greeting each time the script is executed. (BTL6)
15. Develop a JavaScript to check the number is Armstrong number or not by getting the number from textbox and the result is displayed in a alert dialog box. (BTL6)
16. Develop a java script code that accepts user name and password from user, Check their correctness and display appropriate alert messages. (BTL6)

DHTML:

17. Create an inline style sheet. Illustrate the use of an embedded style sheet. (BTL6)
18. Create an external style sheet to illustrate the "Font" elements. (BTL6)
19. Develop a program to switch on and off light using onClick event. (BTL6)
20. Illustrate different types of filters (at least six) on a sample text. (BTL2)
21. Develop a program to illustrate tabular data control for data binding. (BTL6)

XML:

22. Create a small XML file designed to contain information about student performance on a module. Each student has a name, a roll number, a subject mark and an exam mark. (BTL6)
23. Create a internal DTD file. (BTL6)
24. Create an external DTD file. (BTL6)
25. Create a XSLT style sheet to display the student data as an HTML table. (BTL6)

PHP:

26. Illustrate PHP declarations and expressions to find factorial of a given number using. (BTL2)
27. Develop a PHP program that interacts with the user .Collect first name last name and date of birth and displays that information back to the user. (BTL6)
28. Develop a PHP program to connect MySQL Database.(BTL6)

JSP:

29. Develop a program to implement JSP directives. (BTL6)
30. Develop a JSP program for session tracking. (BTL6)

Prescribed Textbook			
	Author	Title	Publisher
1	N.P.Gopalan, J.Akilandeswari	Web Technologies-A Developer‟s Perspective	PHI(2008)
2	Harvey M. Deitel and Paul 1. Deitel	Internet and World Wide Web How To Program, 5e	Prentice Hall; 4th edition

Course Focus: Employability

Websites of Interest:

1. https://www.w3schools.com
2. https://www.edx.org/learn/web-development
3. https://www.codecademy.com/learn/paths/web-development

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme: M.Sc.(Computer Science)

Title of the Paper: Data Mining Lab

Semester: III

Course Code	20CS3L2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam Marks	70
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2021-22	Year of Offering : 2021-22	Year of Revision : 2021-22	Percentage of Revision: Nil

Course Objective:

The main objective of this lab is to impart the knowledge on *How to implement Data Mining Algorithms using Various Tools* and *How to characterize the kinds of Patterns* that can be discovered by *Association Rule Mining*, *Classification*, *Clustering*, *Identifying Outliers* and Emphasize *Hands-on Experience* working with all *Real Time Data Sets*.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Understand the *Various Kinds of Tools*.

CO2: Apply *Mining Techniques* for *Realistic Data*.

CO3: Understand the *Basic Concepts* in R and *Weka*.

CO4: Understand how to import and export *CSV Files* and *Package* installation in R.

CO5: Develop and visualization of *Data Mining Algorithms* in R.

Using Weka Tool:

1. How to create and load *Data Set* in Weka. (BTL1)
2. Interpret all the *Categorical (or Nominal) Attributes* and the *Real-Valued Attributes* separately. (BTL2)
3. Construct *Association Rules* using Weka.(BTL6)
4. Construct *Multilayer Perceptron* or *Neural Network*. (BTL6)
5. Construct *Time Series Forecasting* using Weka. (BTL6)
6. Demonstration of preprocessing to remove *Attributes*, *Instances* and *Perform Discretization* using dataset weather.arff. (BTL2)
7. Create *K-Mean Clustering* using *Weka*.((BTL6)
8. Develop *Decision Tree* by training data set using *Weka*. (BTL6)
9. Create Hierarchical *Clustering* using *Weka*. (BTL6)
10. Identifying and removing *Outliers* using Weka. (BTL1)

Using R Programming:

1. How to import data into R from text and excel files using *read.table()* and *read.csv* functions. (BTL1).
2. Create *Association Rules* using *Aprior Algorithm* in R. (BTL6)
3. Construct *Multilayer Perceptron* or *Neural Network* using R. (BTL6)
4. Apply *Time Series Analysis* using R. (BTL3)
5. Apply *Time Series Forecasting* using R. (BTL3)
6. Apply *Time Series Decomposition* using R. (BTL3)
7. Create *K-Means Clustering Algorithm* using R. (BTL6)
8. Construct *Decision Tree* in R using package party. (BTL6)
9. Create *Hierarchical Clustering* using R. (BTL6)
10. Crate Hierarchical Clustering with Euclidean Distance using R(BTL6)
11. Examine *K-Medoids* clustering using R. (BTL4)
12. *Detecting* and *Removing* outliers using R. (BTL1)
13. Construct *Density Based Clustering* using R. (BTL6)
14. Illustrate *Linear Regression* using R. (BTL2)
15. Illustrate *Multiple Regression* using R. (BTL2)
16. Illustrate Logistic Regression using R. (BTL2)
17. Construct *Outlier Detection by Clustering* using R. (BTL6)
18. Detecting and Removing Missing values in R. (BTL1)
19. Create different kinds of *Charts* using *Sample Data Sets* in R. (BTL6)
20. Create *Word Cloud* using R. (BTL6)

Websites of Interest :

1. https://www.cs.waikato.ac.nz/ml/weka.
2. https://weka.wikispaces.com
3. https://www.rdocumentation.org/packages/stats/versions/3.6.2
4. http://www.r-bloggers.com/

Course Focus: Foundation **/ E**mployability / **S**kill Development.

APPENDIX - III
OPEN ELECTIVES OFFERD BY COMPUTER SCIENCE DEPARTMET

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165
(An Autonomous College in the jurisdiction of Krishna University)
NAAC reaccredited at 'A' level

Programme:

Title of the Paper: Visual Analytics for Executives

Semester: III

Course Code	21CS3OEL1	Course Delivery Method	Face-to-face/Blended Mode
Course Category	Open elective	Lecture-Tutorial-Practice	2-0-4
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	6	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision: Nil

Course Objectives : This Course focuses to know the *Importance of Visualization in the world of Data Analytics and Prediction, To handle Data Sources in Tableau*, To get familiarized about creating visualization using different *Types of Charts*, To gain knowledge about using *Maps in Tableau*, To gain knowledge about *Analysis*, To design *Interactive Dash Boards*.

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

CO1 : Able to know the importance of *Visualization* and connect *Different Data Sources in Tableau*.

CO2 : Able to create *Charts* in *Tableau*.

CO3 : Able to implement *Aggregate Functions, Calculated Fields, Table Calculations* and *Level of Detail Calculations*.

CO4 : Able to implement *Maps* and *Advance Analytic.*

CO5 : Able to create *Interactive Dash Boards*.

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	**Introduction and Getting Started with Tableau:** The Advantages of a Modern Analytics Platform, The Tableau Application Suite, Installing Tableau Desktop Data Preparation, The Sample Dataset, The Tableau Workspace, Working With Measures and Dimensions. Working With Marks, Saving, Opening, And Sharing Your Workbooks. **Adding Data Sources in Tableau:** Setting up a Data Connector, Selecting Data Tables, Joins, Unions, Data Extracts and Live Connections, Editing The Model's Metadata, Data Types, Adding Hierarchies, Calculated Fields and Table, Calculations, Data Collection.	12
II	**Creating Data Visualizations:** Chart Types, Ready, Set, Show Me, Bar Charts, Legends, Filters and Hierarchies,, Line Charts, Highlight Tables, Heatmaps, Bullet Charts, Cumulative Sums With Waterfall Charts, Reflection, The Anatomy of A Tableau Visualization.	12
III	**Aggregate Functions, Calculated Fields, and Parameters:** Aggregate Functions, Calculated Fields, Aggregations in Calculated Fields, Text Operators, Date Fields, Logical Functions In Calculated Fields, Parameters, Searching Text Fields. **Table Calculations and Level of Detail Calculations:** Different Types of Calculations, Quick Table Calculations, Customized Table Calculations, Level of Detail Expressions.	12
IV	**Maps:** Symbol Maps, Filled Maps, Density Maps, Map Layers, Maps With Pie Charts, Viz in Tooltip. **Reflection:** The Anatomy of a Tableau Map, Alternative Map Services, Mapbox Maps, Spatial Data. **Advanced Analytics**: Trends, Forecasts, Clusters and Other Statistical Tools, Overview of The Tableau Analytics Pane, Constant, Average, Reference Lines, Trend Lines, Forecasts, Cluster Analysis.	12
V	**Interactive Dashboards:** Preliminary Considerations, Creating a New Dashboard, The Dashboard Pane, Placing Charts on the Dashboard, Dashboard Titles, Navigation Buttons, Dashboard Actions.	12

Course has focus on : Employability

Websites of Interest :

1. Visual Analytics in Tableau | https://www.youtube.com/watch?v=gEKQ3kigJsM
2. Tableau Training for Beginners | Edureka https://www.youtube.com/watch?v=aHaOIvR00So
3. Tableau Training for Beginners | Simplilearn https://www.youtube.com/watch?v=Wh4sCCZjOwo
4. Tableau Full Course| https://youtu.be/KA0QHWm0nWo

Co-curricular Activities : Programming Contests, workshops & Quiz.

Lab List:

1. Tableau installation. (BTL1)
2. Tableau Introduction /Exploring Tableau. (BTL1)
3. Creating New Workbooks Opening Existing Workbooks in Tableau(BTL3)
4. Data Collection from various sources web/text/csv/JSON (BTL3)
5. Implementing joins and Unions (BTL3)
6. Creating Bar Chart. (BTL3)
7. Creating Pie Chart. (BTL3)
8. Creating Dual Axis Chart. (BTL3)
9. Creating Shared Axis. (BTL3)

10. Creating Cross Tab. (BTL3)
11. Creating Word Cloud. (BTL3)
12. Creating Scatter Plot. (BTL3)
13. Creating Bubble Chart. (BTL3)
14. Implementing Data Blending. (BTL3)
15. Implementing Word Cloud. (BTL3)
16. Implementing Aggregate Functions, Calculated Fields. (BTL3)
17. Implementing Table Calculations and Level of Detail Calculations. (BTL3)
18. Creating Maps. (BTL3)
19. Implementing Trend lines and analytics in Tableau. (BTL3)
20. Creating a Dash Board. (BTL3)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
--------- Programme – III Semester

Course Code: Title: Visual Analytics for Executives
(w.e.f admitted batch 2020-21)

Time: 4 Hours

Answer ALL questions

Max. Marks: 70

Part A
Theory
(5×4 = 20 Marks)
Answer All Questions

1. What is *Dimension* and *Measure*? (BTL1)
2. Explain *Joining Tables* with *Tableau* with example. (BTL2)
3. Explain the role of *Table Data Extract.* (BTL2)
4. How to *Replace Tableau's Standard Maps*? (BTL1)
5. What is *Cluster Analysis*? (BTL2)

Part B (Practical)

(2×25 = 50 Marks)

Answer all Questions

1. a. Creating word clouds using Tableau. (BTL6)
   b. Create a dual axis chart using Tableau. (BTL6)

2. Creating a Simple Dash Board using Tableau. (BTL6)

A.G & S.G Siddhartha Degree College of Arts & Science

Vuyyuru – 521165

(An Autonomous College in the jurisdiction of Krishna University)

NAAC reaccredited at 'A' level

Programme:

Title of the Paper: Web Programming

Semester: III

Course Code	21CS3OEL2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021-22	Year of Revision: 2021-22	Percentage of Revision: 0%

Course Objective: To provide knowledge on *Web Architecture*, *Web Services*, *Client Side* and *Server Side Scripting Technologies*, To focus on the development of *Web Based Information Systems* and *Web Services*, To provide skills to design *Interactive* and *Dynamic Web Sites*.

Course Outcomes: On successful completion of the course student will be able to:

CO1: Understand the *Web Architecture* and *Web Services*.

CO2: Design *Interactive Web Pages* using HTML and *Style Sheets*.

CO3: Design *Interactive Web Pages* using Forms and *Tables*.

CO4: Study about *CSS* and *XML*.

CO5: Create a *Website* using *Wix Platform*.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Internet, History of Internet, Internet Services and Accessibility, Uses of the Internet, Protocols, Web Concepts: The Client/Server Model, Retrieving Data from the Web, How the Web Works?, Web Browsers, Searching information on the Web, Internet Standards. **Internet Protocols:** Internet Protocols, Host Names, Internet Applications And Application Protocols, Email Protocols**.** **World Wide Web:** Basics of WWW and Browsing, URL, Types of Browsers, Features of Browsers.	12

II	**Introduction to HTML:** HTML Document Structure, Creating Headings on Webpage. **Working with Links:** Creating Hyper Link, Setting The Hyper Link Colors, Linking Different Sections of Web Page. **Working with images:** Inserting an Image, Displaying alternate Text for an Image, Adding a Border, Aligning an Image, Using Image as Links, Image Maps. **Working with tables**: Creating a Table, Specifying Caption to a Table, Adding a Table Heading and Border, Aligning a Table and Cell Content, Setting The Width of a Table And Table Columns.	12
III	**Forms:** Creating Forms, Named Input Fields, The <INPUT> Tag, Multiple Lines Text Windows, Drop Down and List Boxes, Text, Text Area, Password, Button, Submit, Reset, Radio, Checkbox, Select Option, Labeling Input Fields, Grouping Related Fields, Disabled and Read Only Fields. **Frames:** Introduction to Frames, Frames Document, The <FRAMESET> Tag, Nesting <FRAMESET> Tag, Placing Content in Frames with the <FRAME> Tag, Targeting Named Frames.	12
IV	**CSS:** Introduction to Style Sheets, Inline Styles, External Style Sheets, Internal Style Sheets, Style Classes, Multiple Styles. **XML:** Introduction, HTML vs. XML, Syntax of XML Document, XML Attributes, Use of Elements vs. Use of Attributes, XML Validation, Well Formed XML Documents, Valid XML Documents, XML DTD: Internal DTD, External DTD, The Buildings Blocks of XML Documents.	12
V	**Make a Website with Wix:** Planning your Wix Website Design, Planning your Website Pages Working, Planning your Website Pictures, Videos and Logos, Wix Signup and Selecting a Premade or Blank Template. **Building Your Wix Website**: Getting to know Wix platform, Getting to know Wix editor, Designing the Header, Footer and Menu, Background for Pages and Sections, Adding Text, Adding Photos, Adding Videos, Adding Icons, Shapes and Boxes, Adding Links, Adding Forms, Adding a Wix Store, Adding a Lightbox.	12

Prescribed Textbook

	Author	Title	Publisher
1	N.P.Gopalan, J.Akilandeswari	Web Technologies-A Developer‟s Perspective	PHI(2008)

Reference Text Book

	Author	Title	Publisher
1	Harvey M. Deitel and Paul 1. Deitel	Internet and World Wide Web How To Program, 5e	Prentice Hall; 4th edition
2	Thomas Powell	Web Design The Complete Reference	TMH Tata McGraw Hill

Course Focus: Employability

Websites of Interest:

1. https://www.w3schools.com/html/default.asp
2. https:www.udemy.com/course/wix-master-course-make-a-website-in-1-day-with-wix

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
---------- Programme - III Semester
Course Code: Title: Web Programming
(w.e.f admitted batch 2020-21)
Time: 3 Hours Max. Marks: 70

Answer ALL questions (10×2 = 20 Marks)

1. a. What is *Web Browser*? Explain it? (BTL1)
   b. What is the *Functionality of HTTP*? (BTL1)
   c. Compare *Tag* and *Attributes* with example. (BTL2)
   d. Describe how you will *Embed Images* in Web document. (BTL1)
   e. Why do we use *<frameset>?* (BTL1)
   f. Write tag for *Drop Down*. (BTL1)
   g. Develop an *Inline Style Sheet* with suitable example.(BTL3)
   h. What is the *Syntax* of *XML*? (BTL1)
   i. How to *Plan* a *Website Design*? (BTL1)
   j. Explain *adding a photo* in *Wix Platform*. (BTL2)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. (5×10 = 50 Marks)

Unit I

2) a) Explain various *Services Offered by Internet* and the *Types Of Internet Connections*. (BTL2)

(or)

b) Explain about *Internet Protocols*. (BTL2)

Unit II

3) a) What is the structure *of HTML Document?* Explain with example. (BTL1)

(or)

b) How to *Create A Table in HTML* with various Attributes? (BTL1)

Unit III

4) a) Discuss *Frame Set* and *Frame Attributes* by writing Program. (BTL6)

(or)

b) Develop a *Form* with *Various Tags* with suitable example. (BTL6)

Unit IV

5) a) What are *Types of CSS*? Explain with example. (BTL2)

(or)

b) What are *Well Formed* and *Valid XML* Documents? (BTL2)

Unit V

6) a) Explain Planning of *Wix Website Pages Working, Website Pictures, Videos and Logos.* (BTL5)

(or)

b) Explain *creating* a *Website* using *Wix Platform*. (BTL5)

APPENDIX - IV
ADD ON COURSE

Applicable for the batch of students applicable during the Academic Year 2021-2022										
M.Sc.(Computer Science)										
III SEMESTER						Add on Course				
S.No.	Course Code	Title of the Course	Instructional Hours per Semester			Credits	Evaluation			Total Marks
							CIA Marks	SEE		
								Marks	Duration	
			L	T	P					
1	20CS3A1	PHP with My SQL Certification			45	4	Nil	Nil	3 Hours	Nil
CIA=Continuous Internal Assessment						SEE=Semester End Examinations				

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165

(An Autonomous College in the Jurisdiction of Krishna University)Accredited at the level 'A' by the **NAAC**

Sponsors: Siddhartha Academy of General& Technical Education

DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG (M.Sc.)

Date: 06-04-2023

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE :: VUYYURU

(An Autonomous College in the Jurisdiction of Krishna University)
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DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG held on 06-04-2023 in the Department of Computer Science.

Name of the Member	Role
Sri. T.Naga Prasada Rao, I/C HOD,Dept of Computer Science, A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru-521165. Mobile: 9866803938, E-Mail: t.nagaprasadarao@gmail.com	Chairman
Dr. K. Madhavi, Associate Professor, Dept of ComputerScience, JNTUA. College of Engineering, Anantapur. Mobile: 9440206501 E-Mail: kasamadhavi@yahoo.com	University Nominee, Krishna University
Dr. R. Satya Prasad, Professor, Department of ComputerScience, Acharya Nagarjuna University, Nagarjuna Nagar-522508.Mobile: 9848487478 E-Mail: profrsp@gmail.com	Subject Expert
Dr. T. S. Ravi Kiran, H.O.D & Assistant Professor, Dept of Computer Science, P.B. Siddhartha Degree College of Arts &Science - Vijayawada -520002. Mobile: 9441176980 E-Mail: kirantsr1 @gmail.com, tsravikiran@pbsiddhartha.ac.in	Special Invitee
Mr. U. Sairam, C.E.O, Codegnan I.T Solutions OPC PVTLTD., Vijayawada520002 Mobile: 9959555952 E-Mail: uppugundlasairam@gmail.com	Industrialist
Mr.Korada Sri Venkata Siva Sai Kumar, Software Developer, GGS Information Services India Pvt., Ltd. Mobile: 8686541443 E-Mail: svkorada@gmail.com	Alumni Representative
Ms. S. Prabhavathi , Assistant Professor, Dept. of Computer Science, A.G & S.G Siddhartha Degree college of arts and science, Vuyyuru – 521165 Mobile : 9989098703 E-mail : s.prabha2424@gmail.com	Member
Ms. A. Sravani , Assistant Professor, Dept. of Computer Science, A.G & S.G Siddhartha Degree college of arts and science, Vuyyuru – 521165 Mobile : 9490866599 E-mail :adirajusravani93@gmail.com	Member
Mr. A.N.Srinivasarao Assistant Professor, Dept. of Computer Science, A.G & S.G Siddhartha Degree college of arts and science, Vuyyuru – 521165 Mobile : 9553539203 E-mail :srinu7mca@gmail.com	Member
Ms.G. Katyayini, Assistant Professor, Dept. of Computer Science, A.G & S.G Siddhartha Degree college of arts and science, Vuyyuru – 521165 Mobile : 9553892569 E-mail : katyayinigona@gmail.com	Member G. katyayini
Mr.Ch. Anil kumar, Assistant Professor, Dept. of Computer Science, A.G & S.G Siddhartha Degree college of arts and science, Vuyyuru – 521165 Mobile : 9701463015 E-mail : aniltimes13@gmail.com	Member

PG

AGENDA

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Second* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2022-2023 and onwards.

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Fourth* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2022-2023 and onwards.

RESOLUTIONS

- Resolved and recommended to continue the same syllabus, model papers without changes in the Second Semester for the following courses:
  - Data Structure Lab (22CS2L1)

- Resolved and recommended to introduce new syllabus, model papers in the Second Semester for the following courses:
  - Computer Networks (22CS2T1)
  - Data Structure (22CS2T2)
  - Web Technology (22CS2T3)
  - Software Engineering (22CS2E1)
  - Web Technology Lab(22CS2L2)

- To discuss and approve the *Structure*, Sy*llabi* and *Model Question Papers* of Open Electives *"Research Methodology"* for Second Semester

- Resolved and recommended to continue the same syllabus, model papers without changes in the Fourth Semester for the following courses:
  - Artificial intelligence & Machine learning (22CS4T3)
  - Cloud Computing (22CS4T4)

- Resolved and recommended to introduce new syllabus, model papers in the Third Semester for the following courses:
  - Big Data Analytical Lab (22CS4L1)
  - Privacy & Security in Online Social Media (22CS4M1)
  - Big Data Analytics (22CS4T1)
  - Project Work (22CS4P1)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru521165.

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc., (ComputerScience) Programme – II Semester

Course	Computer Networks		
Course Code	**22CS2T1**	Course Delivery Method	Class Room /
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Computer Networks is a course that will exemplifies basic concepts of *Computer Networks*, *Functionality of Layered Architecture*, *Error Correction and Detection Code* and *Various Protocols used in Layers and Protocols*, *Functionality of Medium Access Control Sub Layer*, *Various Routing Strategies used in inter networking using IPAddresses*, *Different Services* and *Protocols of Transport Layer* and *Various Application Layer Protocols* used over the internet.

Course Objectives:

This course will help the students t o understand and learn importance of *Protocols in a Network*, *The usage of the Protocols in Layered Architecture* and brief information of functionality of all the *Five Layers and their Protocols*.

Specific objectives include:

- To understand functionality of *Layered Architecturee*.
- To understand Ethernet, *Bluetooth and Data Link Layer Switching.*
- To learn Network Layer Design issues and Routing Algorithm used.
- To learn *Transport Services and TCP and UDP.*
- To understand the Protocols and services of *Applications Layer*.

Course Learning Outcomes:

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

CO1: Understand *Functionality of Layered Architecture*, *Error Correction and Detection Codes* and *Various Protocols used in Layers*.

CO2: Understand functionality of *Medium Access Control* Sub Layer.

CO3: Understand the various *Routing Strategies* used in internet working using *IP Addresses*.

CO4: Understand different Services and Protocols of *Transport Layer*.

CO5: Understand the various *Application Layer Protocols* used over internet.

Unit	Learning Units	Lecture Hours
I	**Introduction:** Uses of Computer Networks: Business Application, Home Applications, Mobile Users, Social Issues, 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:** ALOHA, CSMA, CSMA/CA **Data Link Layer:** ***Data Link Layer Design Issues***: Services Provided to the Network Layer, Framing, Error Control, Flow Control, ***Error Correcting Codes***, ***Error Detecting Codes***, ***Elementary Data Link Protocols***: An Utopian 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.	**12 Hours**
II	**The Medium Access Control Sub Layer:** ***Ethernet***: Ethernet Cabling, Manchester Encoding, The Ethernet MAC sub layer Protocol, The Binary Exponential Backoff Algorithm, ***Bluetooth***: Bluetooth Architecture, Bluetooth Applications, The Bluetooth Protocol Stack, The Bluetooth Radio Layer, The Bluetooth Link Layers, The Bluetooth Frame Structure, ***Data Link Layer Switching***: Uses of Bridges, Learning Bridges ,Spanning Tree Bridges, Remote Bridges, Repeaters, Hubs, Bridges, Switches, Routers and Gateways, Virtual LANs.	**12 Hours**
III	**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 ***The Network Layer in the Internet*:** The IP Version 4 Protocol, IP Address, IPV6 Features and Advantages.	**12 Hours**
IV	**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:** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modelling TCP Connection Management, TCP Sliding Window, TCP Congestion Control, Comparison of TCP and UDP.	**12 Hours**
V	**Wireless TCP:** Classical improvement in WTCP. **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 Pages, Dynamic Web Pages**. *Streaming Audio and Video***: Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, Real Time Conferencing.	**12 Hours**

Reference Text books:

1. Andrew S. Tanenbaum, ComputerNetworks, Sixth Edition, Pearson, 2021
2. Andrew S. Tanenbaum, ComputerNetworks, Fifth Edition, Pearson, 2011
3. James F.Kurose, Keith W Ross, Computer Networking, 3rd Edition, Pearson Edition
4. Michael A. Gallo, William M. Hancock, Data Communications and Networking, 4th Edition, TMH

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)M.Sc.(Computer Science), Second Semester

Course Name: Computer Networks

Course Code: 22CS2T1

(w.e.f admitted batch 2022-23)

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

SECTION-A

Answer ALL Questions. All Questions Carry Equal Marks. (5×4=20Marks)

1. (a) What are the Uses of Computer Networks. (CO1,L1)
   (or)
   (b) Write about ALOHA (CO1,L1)

2. (a) Explain about The Binary Exponential Backoff Algorithm. (CO3,L2)
   (or)
   (b) Explain about Virtual LANs. (CO3,L2)

3. (a) What is Store and Forward Packet Switching. (CO2,L1)
   (or)
   (b) What are the Features of IPV6. (CO2,L1)

4. (a) Explain about Berkeley Sockets. (CO3,L2)
   (or)
   (b) Explain TCP Congestion Control. (CO3,L2)

5. (a) Explain about WTCP. (CO5,L5)
   (or)
   (b) Explain about URLs. (CO5,L5)

SECTION-B

AnswerALLquestions. AllQuestionsCarryEqualMarks.(5×10=50Marks)

6. (a) Explain the OSI Reference Model with a neat diagram. (CO1,L2)
   (or)
   (b) Explain Sliding Window Protocols. (CO1,L2)

7. (a) List the operations of Ethernet.(CO2,L4)
   (or)
   (b) Analyze Bluetooth Architecture with Bluetooth Application. (CO2,L4)

8. (a) Model Shortest Path Routing Algorithm.(CO2,L3)
   (or)
   (b) Select IP Addressing Techniques. (CO2,L3)

9. (a) Explain about Connection Establishment and Connection Release. (CO3,L5)
   (or)
   (b) Explain about TCP. (CO3,L5)

10. (a) Discuss Domain Name System. (CO3,L6)
    (or)
    (b) Discuss Electronic Mail System. (CO3,L6)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – II Semester

Course	**Data Structures**		
Course Code	22CS2T2	Course Delivery Method	Class Room /
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Data Structures is a course that illustrates *Elementary Data Organization*, *Data Structure Operations*, and *Algorithms, Arrays, Matrices, String Processing, Stack, Queues, Linked List, Trees, Heap Sort, Multi-way Search Trees, B-Tree, B+-Trees, Graphs Algorithms, Elementary Graph Algorithms, Sorting* and *Searching Techniques*.

Course Objectives:

This course will help enable the students t o understand, learn and develop *Data Structure Operations and Algorithms, Arrays, Matrices, String Processing, Stack, Queues, Linked List, Trees, Heap Sort, Multi-way Search Trees, B-Tree, B+-Trees, Graphs Algorithms, Elementary Graph Algorithms, Sorting and Searching Techniques*.

Specific Objectives include:

- To understand *Data Structures, Data Structure Operations* and *Algorithms, Arrays*.
- To understand *String Processing, Stack, Queues and Linked List.*
- To learn the *Binary Tree, Binary Search Trees, AVL Trees, Heap*.
- To learn the *Multi-way Search Trees, B-Trees, B+-Trees*.
- To understand the *Graph Algorithms*, different *Sorting* and *Searching Techniques*.

Course Learning Outcomes:

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

CO1: Understand *Data Structures, Data Structure Operations and Algorithms, Arrays*.
CO2: Understand *String Processing, Stack, Queues and Linked List.*
CO3: Learn the Binary Tree, Binary Search Trees, AVL Trees, Heap.
CO4: Learn the *Multi-way Search Trees, B-Trees, B+-Trees*.
CO5: Understand the *Graph Algorithms*, different *Sorting* and *Searching Techniques*.

Unit	Title	Lecture Hours
I	**Introduction and Overview:** Elementary Data Organization, Data Structures, Data Structure Operations, and Algorithms: Complexity, Time and Space Tradeoff Asymptotic Notations. Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting, Linear Search, Binary Search, Multidimensional Arrays, Pointer Arrays, Record Structures, Representation of records in memory, Parallel Arrays, Matrices, Sparse Matrices.	**12 Hours**
II	**String Processing:** Pattern Matching Algorithms. **Stacks:** Stacks, Array representation, Linked List representation, Evaluation of Arithmetic Expressions, Quick Sort, Recursion, Towers of Hanoi. **Queues:** Linked representation of Queues, Deques, Priority Queues. **Linked Lists:** Representation, Traversing, Searching, Memory Allocation: Garbage Collection,Insertion, Deletion, Header Linked Lists, Two Way Lists.	**12 Hours**
III	**Trees:** Binary Trees, Representing and Traversing Binary Trees, Traversal Algorithms using Stacks, Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, AVL Search Trees, Insertion and Deletion in AVL Trees. **Heap:** Heap Sort, Huffman's Algorithms, General Trees.	**12 Hours**
IV	**Multi-way Search Trees:** M-Way Search Trees, Definition and Properties, Searching an M-Way Search Tree, B-Trees, Definition and Properties, Number of Elements in a B-Tree, Insertion into B-Tree, Deletion from a B-Tree, B+-Tree Definition, Searching a B+-Tree, Insertion into B+-Tree, Deletion from a B+-Tree.	**12 Hours**
V	**Graphs:** Graphs Algorithms, Elementary Graph Algorithms: Topological Sort, Single Source Shortest Path Algorithms:Dijkstra's, Bellman-Ford, All Pairs Shortest Paths : Floyd Warshall's Algorithm. **Sorting and Searching:** Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and Data Modification, Hashing.	**12 Hours**

Reference Textbooks:

1. Seymour Lipschutz, Data Structures, Mc Graw Hill (Schaums Outlines), Revised First Edition, 2014.
2. Seymour Lipschutz, Theory and Problems of Data Structures, Mc Graw Hill (Schaums Outlines), Paperback, 2017.
3. John R Hubbard, Second Edition, Data Structures with Java, Mc Graw Hill (Schaums Outlines), 2009.
4. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education, 2017.
5. Fundamentals of Data Structures in C, Second Edition, Horowitz, Sahani, Anderson-freed, Universities Press, 1993.
6. Data Structures: A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage, 2004

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru– 521165.

(An Autonomous College in the jurisdiction of
Krishna University)M.Sc.(Computer Science),
Second Semester

Course Name: Data Structures

Course Code: 22CS2T2

(w.e.f admitted batch 2022-23)

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

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1.(a) Explain different *Data Structure Operations*. (CO1, L2)

(or)

(b) Explain *Linear Array*.(CO1, L2)

2. (a) What is *Stack*? Explain its Operations. (CO2, L1)

(or)

(b) Define *Linked List* and its operations. (CO2, L1)

3. (a) Explain *Binary Search Trees*. (CO3, L2)

(or)

(b) Explain *General Trees*. (CO3, L2)

4. (a) Explain *M-Way Search Tree.* (CO4, L2)

(or)

(b) Explain *searching an element* from *B+-Tree*. (CO4, L2)

5. (a) Explain *Topological Sort Algorithm*. (CO5, L2)

(or)

(b) Explain *Bellman-Ford Algorithm*. (CO5, L2)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6. (a) Explain Binary Search and Linear Search Algorithms with example. (CO1, L2)

(or)

(b) Explain *Multidimensional Arrays in Java with example*. (CO1, L2)

7. (a) Explain *Towers of Hanoi Problem* implementation *with example*. (CO2, L5)

(or)

(b) Explain Operations of *Queue* using *Linked List with example*. (CO2, L5)

8. (a) Discuss *AVL Search Trees operations* in detail. (CO3, L6)

(or)

(b) Discuss about the insertion and deletion operations of Binary Search Trees with example. (CO3,L6)

9. (a) List *B-Tree operations* with examples. (CO4, L4)

(or)

(b) List insertion and deletion operations of B+-Tree with examples. (CO4, L4)

10. (a) Utilize Merge Sort Algorithm to sort the elements 10, 45, 15, 56, 48, 23, 8, 17. Explain step by step procedure. (CO5, L3)

(or)

(b) Make use of elements 23, 34, 12, 45, 14, 73, 21, 7 perform sort using Radix Sort. (CO5, L3)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – II Semester

Course	Web Technologies		
Course Code	22CS2T3	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:**2020-**	Year of Offering:2021-	Year of Revision:2021-	Percentage of Revision:

Course Description and Purpose:
Web Technologies (22CA2T3) is a course that illustrates about *WWW*, *HTML*, Write code in *JavaScript & DHTML*, *Designing of XML Files*, Install and use *Servlets* and *PHP*, *Programming in JSP*, *Establish Database Connectivity & Form Validations using C#*, *Basic knowledge of Node JS, Express & Spring Boot*, *Creating AJAX form validations*.

Course Objectives: The course will help the students to understand, learn and build *WWW, HTML, Write code in JavaScript & DHTML, Designing of XML Files, Install and use Servlets and PhP, Programming in JSP, Establish Database Connectivity & Form Validations using C#, Basic knowledge of Node JS, Express & Spring Boot, Creating AJAX form validations*.

Course Objectives:

- To understand the concepts of WWW including *Browser and HTTP Protocol* and various *HTML Tags* and use them to develop the user friendly web pages.
- To use the *JavaScript* and define the CSS with its types to develop the *Dynamic Web Pages*.
- Students will be able to and develop the *Modern Web Pages* using the *XML Elements* and Servlets with different layouts as per need of applications.
- Able to develop *Server Side Scripting* with PHP and JSP to generate the Web Pages dynamically using the Database Connectivity & C# Database Connectivity with Form Validations.
- Able to develop *Interactive Forms* for Web Applications using *Node JS*, *Express*, *Spring Boot* & *AJAX*.

Course Outcomes:
On successful completion of this course, the students:
CO1: Able to understand the concepts of WWW including *Browser* and *HTTP Protocol* and various *HTML Tags* and use them to develop the user friendly web pages.
CO2: Able to use the *JavaScript* and define the CSS with its types to develop the *Dynamic Web Pages*.
CO3: Students will be able to develop the *Modern Web Pages* using the *XML Elements* and Servlets with different layouts as per need of applications.
CO4: Able to develop *Server Side Scripting* with PHP and JSP to generate the Web Pages dynamically using the Database Connectivity C# Database Connectivity with Form Validations.
CO5: Able to develop *Interactive Forms* for Web Applications using *Node JS*, *Express*, *Spring Boo*t & *AJAX*.

Unit	Learning Units	LectureHours
I	**Introduction:** What is Internet, History of Internet, Internet Services and Accessibility, Uses of the Internet, Protocols, **Web Concepts:** The Client/Server Model, Retrieving Data from the Web, How the Web Works?, Web Browsers, Searching information on the Web, Internet Standards. **HTML:** Outline of an HTML Document, **Head Section Body Section:** Headers, Paragraphs, Text Formatting, Linking, Internal Linking, Embedded Images, Lists, Tables, Frames, Other Special Tags and Characters, HTML Forms.	**12 Hours**
II	**Java Script:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays, Objects, Document Object Model, Events. **Dynamic HTML (DHTML):** Introduction, Cascading Style Sheets (CSS), Coding CSS, Properties of Tags, Property Values, Other Style Properties, In Line Style Sheets, Embedded Style Sheets, External Style Sheets, Grouping - Inheritance, Class as Selector, ID as Selector, Contextual Selector, Pseudo Classes and Pseudo Elements, Positioning - Backgrounds, Element Dimensions, DHTML Document Object Model and Collections, Using the Collections All, Moving Object around the Document, Event Handling, Assigning Event Handlers, Event Bubbling, Filters and Transition Filters, Transitions, Data Binding, Using Tabular Data Control, Sorting Data, Dynamic Sorting, Filtering.	**12 Hours**
III	**XML:** Introduction, HTML vs. XML, Syntax of XML Document, XML Attributes, Use of elements vs. Use of Attributes, XML Validation, Well Formed XML Documents, Valid XML Documents, XML DTD: Internal DTD, External DTD, The Buildings blocks of XML Documents, **DTD Elements** : Declaring an Element, Empty Elements, Elements with Data, Elements with Children, Wrapping, Declaring only one Occurrence of the Same Elements, Declaring Minimum one Occurrence of the Same Element, Defining Zero or One Occurrence of the Same Element, Declaring Mixed Content, **DTD Attributes**: Declaring Attributes, Default Attribute Value, Implied attribute, required attribute, fixed attribute value, enumerated attribute values, DTD Entries, DTD Validation, XSL, XSL Transformation, XML NameSpaces, XML Schema. Servlets: Introduction, Advantages of Servlets over CGI, Installing Servlets, The Servlet Life Cycle, Servlets API, A Simple Servlet, Handling HTTP Get Requests, Handling HTTP Post Requests, Cookies, Session Tracking, Multi Tier Applications using Database Connectivity, Servlets Chaining.	**12 Hours**
IV	**PHP:** Introduction, PHP Basics, String Processing and Regular Expressions, Form Processing and Business Logic, Connecting to a Database, Using Cookies, Dynamic Content, Operator Precedence Chart. **Java Server Pages (JSP):** Introduction, Advantages of JSP, Developing first JSP, Components of JSP, Reading Request Information, Retrieving the Data Posted from a HTML File to a JSP File, JSP Sessions, Cookies, Disabling Sessions. **Database Connectivity & Form Validations using C#:** Database Connectivity using C#.Net, Form Validations (Name Validation, Integer Validation, Floating Point Validation, Email Validation, Combo Box Validation). **Spring Boot:** Introduction to Spring Boot, Spring Initializer, Maven, Gradel, Class Path Dependencies Creating Executable Jar File.	**12 Hours**
V	**Getting Started with Node:** Getting Node, Using the Terminal, Editors, npm, A Simple Webserver with Node (Hello World, Event Driven Programming, Routing, Serving Static Resource). **Saving Time with Express:** Scaffolding, Initial Steps (Views and Layouts, Static Files and Views, Dynamic Content in Views). **Form Handling:** Sending Client Data to Server, HTML Forms. Encoding, Approaches in Form Handling, Form Handling with Express, Handling AJAX Forms-File Uploads, jQuery File Upload.	**12 Hours**

Reference Books:

1. N.P.Gopalan, J.Akilandeswari, Web Technologies - A Developer's Perspective, PHI(2008)
2. Harvey M.Deitel and Paul L. Deitel, Internet and World Wide WebHow To Program, Prentice Hall, 5th Edition.
3. Ethan Brown, Web Development with Node & Express, O'Reilly, First Edition, 2014.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)M.Sc.(Computer Science), Second Semester

Course Name: Web Technologies

Course Code: 22CA2T3

(w.e.f admitted batch 2022-23)

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

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1.(a) What are *protocols* used in accessing the internet? (CO1, L1)

(or)

(b) What are the differences between *Inline* & *Block Elements*? (CO2, L1)

2. (a) What is *DOM*? Explain it. (CO2, L1)

(or)

(b) What is advantage of using *External Style Sheets*? (CO2,L1)

3. (a) What is *XML Document Validation*? Explain in detail. (CO3,L1)

(or)

(b) What is *Servlet*? Explain in detail. (CO3,L1)

4. (a) List C# function to validate *Name of the User*. (CO4,L1)

(or)

(b) List the components of *JSP*. (CO4,L2)

5. (a) State various *services of Web Browser*. (CO5,L5)

(or)

(b) What are the features of *JQuery*? Explain it (CO5,L5)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6. (a) Explain services of *Internet* and *Web Browser*. (CO1, L2)

(or)

(b) Explain *Client-Server Architecture and Frame and its attributes with example program*. (CO1,L2)

7. (a) List *JavaScript variables and characteristics of Array objects*. (CO2, L4)

(or)

(b) Examine building an *External Style Sheet*. Explain advantages and disadvantages of *External Style Sheets* with an example. (CO2, L4)

8. (a) Develop *TDC*, *DTD* with building blocks of *DTD* . (CO3,L3)

(or)

(b) Develop *Life Cycle of Servlets*. Write the session tracker that tracks the number of access and last access of data of a particular web page. (CO3,L3)

9. (a) Discuss (i) *String Processing* (ii) *Regular Expressions* (iii*) Cookies*. (CO4, L6)

(or)

(b) Discuss *Components of JSP* and *write a JSP Program to accept username and password From a user and validate them*. (CO4, L6)

10. (a) Explain *Class Path Dependencies*. (CO5,L5)

(or)

(b) Explain how to upload Files using *jQuery* with example program. (CO5, L5)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme - II Semester

Course	Software Engineering		
Course Code	22CS2E1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:**2020-**	Year of Offering:2021-	Year of Revision:2021-22	Percentage of Revision:

Course Description and Purpose:
Software Engineering (22CS2E1) is a course that illustrates Process Models, Agile Development, Core Principles, Requirements Modeling, Data Modeling, Software Quality Assurance, Software Testing Strategies, Testing Conventional Applications, Project Management Concepts, Process and Project Metrics, Formal Modeling and Verification and Estimation for Software Project.

Course Objectives: *The course will help the students to understand, learn and build Process Models, Agile Models, Core Principles, Requirement Models, Data Models, Software Quality Assurance Procedures, Software Testing Strategies, Strategies to Test Conventional Applications, Project Management Concepts, Process and Project Metrics, Formal Modeling and Verification and Models to estimate Software Projects.*

Specific objectives include:

- *To understand various Software Engineering Methods, Practices, Process Models and Agile Development Strategies*.
- To understand and apply *Core Principles, Requirements & Modeling* Concepts.
- To understand and apply different *Software Testing Approaches* and various aspects of *Software Quality Assurance*.
- To understand and apply *Process & Project Management* Concepts.
- To understand and apply *Software Estimates for Projects* & apply *Formal Methods Modeling*.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand various *Software Engineering Methods, Practices, Process Models* and *Agile Development Strategies.*
CO2: Understand and apply *Core Principles, Requirements & Modeling* Concepts.
CO3: Understand and apply different *Software Testing Approaches* and various aspects of *Software Quality Assurance*.
CO4: Understand and apply *Process & Project Management* Concepts.
CO5: Understand and apply *Software Estimates for Projects* & apply *Formal Methods Modeling*.

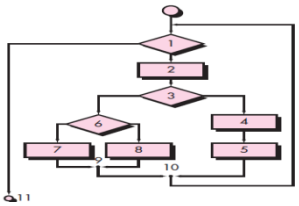
SYLLABUS

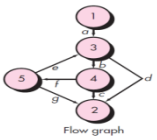
Unit	Learning Units	Lecture Hours
I	**Software and Software Engineering:** The Nature of Software: Defining Software, Software Application Domains, Legacy Software, The Unique Nature of Web Apps, Software Engineering, The Software Process, Software Engineering Practices: The Essence of Practice, General Principles, Software Myths. **Process Models:** A Generic Process Model: Defining a Framework Activity, Identifying a Task Set, Process Patterns, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, A Final Word on Evolutionary Processes, Specialized Process Models: Component-Based Development, The Formal Methods Model, Aspect-Oriented Software Development, The Unified Process: A Brief History, Phases of the Unified Process, Personal and Team Process Models: Personal Software Process (PSP), Team Software Process (TSP). **Agile Development**: What Is Agility, Agility and the Cost of Change, What Is an Agile Process: Agility Principles, The Politics of Agile Development, Human Factors, Extreme Programming (XP): XP Values, The XP Process, Industrial XP, The XP Debate, Other Agile Process Models: Adaptive Software Development (ASD), Scrum, Dynamic Systems Development Method (DSDM), Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modeling (AM), AgileUnified Process (AUP).	**12 Hours**
II	**Principles that Guide Practice: Core Principles:** Principles That Guide Process, Principles That Guide Practice**,** Principles That Guide Each Framework Activity: Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles. **Requirements Modeling: Scenarios, Information, and Analysis Classes:** Requirements Analysis: Overall Objectives and Philosophy, Analysis Rules of Thumb, Domain Analysis, Requirements Modeling Approaches, Scenario-Based Modeling: Creating a Preliminary Use Case, Refining a Preliminary Use Case, Writing a Formal Use Case, UML Models That Supplement the Use Case: Developing an Activity Diagram, Swim lane Diagrams. **Data Modeling Concepts:** Data Objects, Data Attributes, Relationships, Class-Based Modeling: Identifying Analysis Classes, Specifying Attributes, Defining Operations, Class-Responsibility- Collaborator (CRC) Modeling, Associations and Dependencies, Analysis Packages.	**12 Hours**
III	**Software Quality Assurance:** Background Issues, Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics: SQA Tasks, Goals, Attributes, and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance: A Generic Example, Six Sigma for Software Engineering, Software Reliability : Measures of Reliability and Availability, Software Safety, The ISO 9000 Quality Standards, The SQA Plan. **Software Testing Strategies:** A Strategic Approach to Software Testing : Verification and Validation, Organizing for Software Testing, Software Testing Strategy-The Big Picture, Criteria for Completion of Testing, Strategic Issues, Test Strategies for Conventional Software: Unit Testing, Integration Testing, Test Strategies for Object-Oriented Software: Unit Testing in the OO Context, Integration Testing in the OO Context, Test Strategies for Web Apps, Validation Testing: Validation-Test Criteria, Configuration Review, Alpha and Beta Testing, System Testing: Recovery Testing, Security Testing, Stress Testing, Performance Testing, Deployment Testing, The Art of Debugging: The Debugging Process, Psychological Considerations, Debugging Strategies, Correcting the Error **Testing Conventional Applications:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing: Flow Graph Notation, Independent Program Paths, Deriving Test Cases, Graph Matrices, Control Structure Testing: Condition Testing, Data Flow Testing, Loop Testing, Black-Box Testing: Graph-Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.	**12 Hours**

IV	**Project Management Concepts:** The Management Spectrum: The People, The Product, The Process, The Project, People: The Stakeholders, Team Leaders, The Software Team, Agile Teams, Coordination and Communication Issues, The Product: Software Scope, Problem Decomposition, The Process: Melding the Product and the Process, Process Decomposition, The Project, The W5HH Principles. **Process and Project Metrics:** Metrics in the Process and Project Domains: Process Metrics and Software Process Improvement, Project Metrics, Software Measurement: Size-Oriented Metrics, Function-Oriented Metrics, Reconciling LOC and FP Metrics, Object-Oriented Metrics, Use-Case– Oriented Metrics, Web App Project Metrics, Metrics for Software Quality: Measuring Quality, Defect Removal Efficiency.	**12 Hours**
V	**Formal Modeling And Verification:** The Cleanroom Strategy, Functional Specification: Black-Box Specification, State-Box Specification, Clear-Box Specification, Cleanroom Design: Design Refinement, Design Verification, Cleanroom Testing: Statistical Use Testing, Certification, Formal Methods Concepts, Applying Mathematical Notation for Formal Specification, Formal Specification Languages: Object Constraint Language (OCL), The Z Specification Language. **Estimation for Software Projects:** Resources: Human Resources, Reusable Software Resources, Environmental Resources, Software Project Estimation, Decomposition Techniques: Software Sizing, Problem-Based Estimation, An Example of LOC-Based Estimation, An Example of FP-Based Estimation, Empirical Estimation Models: The Structure of Estimation Models, The COCOMO II Model, The Software Equation, Estimation for Object-Oriented Projects.	**12 Hours**

Case Studies:

- Draw example for Process Pattern when requirements are uncertain.
- Draw UML use case diagram for Safehome Security Function.
- Draw UML Activity Diagram for Access camera surveillance via the Internet - display camera views function.
- Draw UML Swimlane Diagram for Access camera surveillance via the Internet - display camera views function.
- Draw UML Class Diagram for Floor Plan.
- Draw UML Package for specifying Environment, Characters of the Game and Rules of the Game.
- Draw Level 1 DFD for Safehome Security Function
- Draw State diagram for Safehome Security Function
- Draw Sequence Diagram (partial) for the Safehome Security Function
- A UML Deployment Diagram for Safehome Security Function.
- Draw Flow Graph for Flow Chart and find the Cyclomatic Complexity.





- Draw the Graph Matrix for the Flow Graph
- Draw Generalization diagram by specifying Structural Constraint.
- Specify sample (a) Project Metrics (b) Product Metrics
- Specify (i) Decision Table (ii) Decision Tree in Block Box Testing
- Draw the Block Diagram for Block Handler and also specify the logic using Object Constraint Language (OCL)

1. No block will be marked as both unused and used.
2. All the sets of blocks held in the queue will be subsets of the collection of currently used blocks
3. No elements of the queue will contain the same block numbers.
4. The collection of used blocks and blocks that are unused will be the total collection of blocks that make up files.
5. The collection of unused blocks will have no duplicate block numbers.
6. The collection of used blocks will have no duplicate block numbers.
7. Using Z Specification Language describes the state of the block handler and the data invariant:

Reference Text Books:

1. Roger S Pressman, Software Engineering - A Practitioner's Approach, Ninth Edition, McGraw - Hill, A Business Unit of The McGraw-Hill Companies, Inc., 2020.
2. Roger S Pressman, Software Engineering - A Practitioner's Approach, Seventh Edition, McGraw - Hill, A Business Unit of The McGraw-Hill Companies, Inc., 2010.
3. Sommerville, Software Engineering, 7th Edition, Pearson Education, 2004.
4. S.A.Kelkar, Software Engineering - AConcise Study, PHI, January 2007.
5. Waman, Software Engineering, TMH, June 2004.
6. AH Behforooz and Frederick J.Hudson, Software Engineering Fundamentals, Oxford, 2008.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)M.Sc.(Computer Science), Second Semester

Course Name: Software Engineering

Course Code: 22CS2E1

(w.e.f admitted batch 2022-23)

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

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1. (a) What are various aspects of is *PSP* and *TSP*? (CO1, L1)

(or)

(b) What is *SCRUM*? Explain it in detail. (CO2, L1)

2. (a) What are the phases of *Extreme Programming (XP)*? (CO2, L1)

(or)

(b) What is *Class-Based Modeling*? Explain it by writing Class Diagram (CO2,L1)

3. (a) What is *Software Reliability*? Explain in detail. (CO3,L1)

(or)

(b) What is *Alpha* and *Beta* Testing? Explain in detail. (CO3,L1)

4. (a) List W5HH Principles. (CO4,L1)

(or)

(b) What is *Use Case Diagram*? Demonstrate with example. (CO4,L2)

5. (a) State various *resources* of Information System. (CO5,L5)

(or)

(b) What is *Software Sizing*? Explain it (CO5,L5)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6. (a) Explain various types of *Software Myths*. (CO1, L2)

(or)

(b) Explain *Incremental Process Models*. (CO1,L2)

7. (a) List *(i) Planning Principles (ii) Modeling Principles*. (CO2, L4)

(or)

(b) Examine various aspects of *Scenario-Based Modeling*. (CO2, L4)

8. (a) Develop various test strategies to test *Conventional Software*. (CO3,L3)

(or)

(b) Develop various strategies for *White Box Testing*. (CO3,L3)

9. (a) Discuss the *Management Spectrum* in detail. (CO4, L6)

(or)

(b) Discuss *(i) Size-Oriented Metrics (ii) Function-Oriented Metrics* in detail. (CO4, L6)

10. (a) Explain *Functional Specification* of *Cleanroom Strategy*. (CO5,L5)

(or)

(b) Explain *(i) The COCOMO II Model (ii) The Software Equation* of EmpiricalEstimation Models. (CO5, L5)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - II Semester

Course	Data Structures Lab		
Course Code	22CS2L1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: **2023**	Year of Offering:22-23	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Data Structures Lab (22CS2L1) is a course that illustrates concepts of *Stacks*, *Queues*, and *Tree Traversals*, *Singly Linked Lists*, *Doubly Linked Lists*, *Circular Linked Lists*, *Binary Search Tree*, *Binary Search Tree Traversals*, *Sparse Matrix and DFS & BFS Algorithm*, *Searching & Sorting Algorithms*, *AVL-Trees and B-Trees* and its operations and implementations.

Course Objectives:

This course will help enable the students to understand learn, apply/ implement the concepts of *Stacks*, *Queues*, and *Tree Traversals*, *Singly Linked Lists*, *Doubly Linked Lists*, *Circular Linked Lists*, *Binary Search Tree*, *Binary Search Tree Traversals*, *Sparse Matrix* and *DFS & BFS Algorithm*, *Searching & Sorting Algorithms*, *AVL-Trees* and *B-Trees*.

Specific Objectives include:

- To understand the concepts of Stacks, Queues, and Tree Traversals.
- To apply the operations of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists and Operations on Stacks and Queues.
- To apply operations on Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFS Algorithm.
- To implement Searching & Sorting Algorithms.
- To implement AVL-Trees and B-Trees.

Course Learning Outcomes:

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

CO1: Understand the concepts of *Stacks*, *Queues*, and *Tree Traversals*.

CO2: Apply the operations of *Singly Linked Lists*, *Doubly Linked Lists*, *Circular Linked Lists* and *Operations on Stacks and Queues*.

CO3: Apply operations on *Binary Search Tree*, *Binary Search Tree Traversals*, *Sparse Matrix and DFS & BFS Algorithm*.

CO4: Implement *Searching & Sorting Algorithms*.

CO5: Implement *AVL-Trees* and *B-Trees*.

CYCLE 1

1. Write a Java Program to create a class called Stack and implement Stack Operations. (CO1,L1)
2. Write a Java Program to create a class called Queue and implement Stack Operations. (CO1,L1)
3. Write a Java Program to convert the Infix to Postfix Expression. (CO1,L1)
4. Write a Java Program to evaluate Postfix Expression. (CO1,L1)
5. Write a Java Program to obtain the Binary Number for a given Decimal Number. (CO1,L1)

CYCLE 2

1. Write a Java Class to implement the operations of a Singly Linked List. (CO2,L1)
2. Write a Java Class to implement the operations of a Doubly Linked List. (CO2,L1)
3. Write a Java Class to implement the operations of a Circular Linked List. (CO2,L1)
4. Write a java program for the following a) Reverse a Linked List b) Sort the data in a Linked List c) Remove Duplicates d) Merge Two Linked Lists (CO2,L1)

5. Write a java program for performing various operations on Stack using Linked List. (CO2,L1)
6. Write a java program for performing various operations on Queue using Linked List. (CO2,L1)

CYCLE 3

1. Write a Java Program to implement operations on Binary Trees Using Recursive and Non- Recursive Methods. (CO3,L1)
2. Write a Java Program to perform Binary Search Tree Traversal. (CO3,L1)
3. Write a Java Program to implement Sparse Matrix. (CO3,L1)
4. Write a Java Program to implement DFS Algorithm. (CO3,L1)
5. Write a Java Program to implement BFS Algorithm. (CO3,L1)

CYCLE 4

1. Write a Java Program to implement the following sorting techniques:
   a. Bubble Sort b. Merge Sort. c. Quick Sort. d. Heap Sort. (CO4,L1)
2. Write a Java Program to implement Quick Sort of given elements. (CO4,L1)
3. Write a Java Program to implement the Following search techniques:
   a. Linear Search b. Binary Search (CO4,L1)

CYCLE 5

1. Write a Java Program to implement various operations on AVL Trees. (CO5,L1)
2. Write a Java Program to perform the following operations: a) Insertion into a B-Tree b) Searching in a B-Tree (CO5,L1)
3. Write a Java Program to implementation of recursive and non-recursive functions to Binary Tree Traversals (CO5,L1)
4. Write a Java Program to implement all the functions of Dictionary (ADT) using Hashing. (CO5,L1)

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added , and to be executed in the laboratory.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science)Programme - IISemester

Course	Web Technologies Lab		
Course Code	22CS2L2	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: **2023**	Year of Offering:22-23	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Web Technologies Lab (22CS2L2) is a course that illustrates concepts of *HTML, Java Script, DHTML, XML, PHP, JSP, Angular JS, Svelet and Git.*

Course Objectives:

This course will help enable the students to understand, learn, design *Static and Dynamic WebPages, Create XML Style Sheets, write PHP programs for data retrieval, write JSP Applications* for *Client-Server Communication, can create Directives, Events, Data Binding* and *Database Connectivity* using *Angular JS* and *Bindings & Events using Svelte* and *Version Controlling using Git*.

Specific Objectives include:

- To build functional web applications using *HTML*.
- To create *Dynamic Web Pages* using *Java Script* and *DHTML*.
- To create *Style Sheets with XML* and write *PHP Programs for Data Retrieval*.
- To create *JSP Applications* for *Client-Server Communication*.
- To create *Directives, Events, Data Binding* and *Database Connectivity* using *Angular JS* and *Bindings & Events using Svelte* and *Version Controlling using Git*.

Course Outcomes:

Upon successful completion of the course, the student will be able to:
CO1: Build functional web applications using *HTML*.
CO2: Create *Dynamic Web Pages* using *Java Script* and *DHTML*.
CO3: Create *Style Sheets with XML* and write *PHP Programs for Data Retrieval*.
CO4: Create *JSP Applications* for *Client-Server Communication*.
CO5: Create *Directives, Events, Data Binding* and *Database Connectivity* using *Angular JS* and *Bindings & Events using Svelte* and *Version Controlling using Git*.

HTML:

1. Write HTML code to provide intra document linking. (CO1, L1)
2. Write HTML code to provide inter document linking. (CO1, L2)
3. Write a program to implement the three types of lists. (CO1, L1)
4. Create a HTML page using frames. (CO1, L6)
5. Write a program to embed college picture into your web page and write a short note on your college using paragraph tag. (CO1, L1)
6. With a suitable example, depict how we can align text using a table tag as follows. (CO1, L3)
7. Write a program to create the time table as follows: (CO1, L1)
8. Create a Registration form that interacts with the user. Collect *Login Name, Password, Date of Birth, Sex, Address, Qualification* and display a "Thanks for Registering" message when the user submits the form. (CO1, L6)

JAVA SCRIPT:

9. Write a script to compare two strings using String object. (CO2, L1)
10. Write a script to generate random numbers within 1 to 10 and display the numbers in a table. (CO2, L1)

11. Write a Java Script to update the information into the array, in the "onClick" event of the button "Update". (CO2, L1)
12. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill with the total being added up simultaneously. (CO2, L3)
13. Write a script to find the duplicate elements of an array. (CO2, L1)
14. Write a script which generates a different greeting each time the script is executed. (CO2, L1)
15. Write a javascript to check the number is Armstrong number or not by getting the number from textbox and the result is displayed in a alert dialog box. (CO2, L1)
16. Using functions write a java script code that accepts user name and password from user,Check their correctness and display appropriate alert messages. (CO2, L1)

DHTML:

17. Create an inline style sheet.Illustrate the use of an embedded style sheet. (CO2, L6)
18. Create an external style sheet to illustrate the "Font" elements. (CO2, L6)
19. Write a program to switch on and off light using onClick event. (CO2, L1)
20. Illustrate different types of filters (atleast six) on a sample text. (CO2, L2)
21. Write a program to illustrate tabular data control for data binding. (CO2, L1)

XML:

22. Create a small XML file designed to contain information about student performance on a module. Each student has a name , a roll number, a subject mark and an exam mark. (CO3, L6)
23. Create a internal DTD file. (CO3, L6)
24. Create an external DTD file. (CO3, L6)
25. Create a XSLT stylesheet to display the student data as an HTML table. (CO3, L6)

PHP:

26. Calculate the factorial of a given number using PHP declarations and expressions. (CO3,
27. Write a PHP program that interacts with the user. Collect first name lastname and date of birth and displays that information back to the user. (CO3, L1)

JSP:

28. Write a program to implement JSP directives.(CO4, L1)
29. Write a JSP program for session tracking.(CO4, L1)

ANGULAR JS:

30. Create Registration and Login Forms with Validations using JScript Query. (CO5, L6)
31. Implement the following in Angular JS (CO5, L5)
    (a) Angular JS Data Binding
    (b) Angular JS Directives and Events
    (c) Using Angular JS to fetch Data from MySql

SVELTE: Illustrate the following (CO5, L2)

32. Reactivity using SVELTE.
33. Bindings using SVELTE.
34. Transitions using SVELTE.

Git: Illustrate the following (CO5, L2)
Version Control Using Git.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added , and to be executed in the laboratory.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - IV Semester

Course	BIG DATA ANALYTICS		
Course Code	20CS4T1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Outcomes:
On successful completion of this course, the students:

- Understand basics of Big Data. (CO1)
- Gain knowledge on *Big Data Analytics*. (CO2)
- Be familiar with *HDFS , and hadoop environment*. (CO3)
- Have knowledge on Mongo DB. (CO4)
- Gain knowledge on PIG and Jaspersoft. (CO5)

Unit	Learning Units	Lecture Hours
I	**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.	12
II	**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.	10
III	**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.	14
IV	**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.	10
V	**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.	14

Prescribed Text Book:

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

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 20MCS402 Title: BIG DATA ANALYTICS

Time: 3Hours Max.Marks:70

SECTION-A

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.

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5×10=50Marks)**

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

(Or)

B) Explain Need and Challenges in Big Data Environment?

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

(or)

B) Explain Classification of Analytics with suitable example..

4.A) Describe characteristics of a NoSQL database.?

(or)

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

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

(or)

b) Explain the essentials of Hadoop Ecosystem.?

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.

A.G & S.G Siddhartha Degree College of Arts and Science,Vuyyuru-521165
(An Autonomous College in the jurisdiction of Krishna University
M.Sc.(Computer Science) Programme - IV Semester

Course	BIG DATA ANALYTICS LAB		
Course Code	20CS4L1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Lab List

1. Hadoop standalone installation in Linux.

2. Hadoop installation on windows environment- VM virtual box.

3. Exploring Hadoop Distributed File System (HDFS).

4. Map Reduce Program - Word Count (Python).

5. Write a Map Reduce Program that mines weather data. (Python).

6. Installation of Apache Pig.

7. Pig-Basic Operations: LOAD, FOREACH, GENERATE, GROUP, JOIN, DUMP / STORE.

8. Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

9. Installation of MongoDB.

10. CRUD (Create, Read, Update and Delete) operations in MongoDB.

11. Implementation of Aggregate and Map Reduce function in MongoDB.

12. Creating New Workbooks, Opening Existing Workbooks in Tableau.

13. Prepare Bar Chart, Line / Area Chart, Pie Charts in Tableau.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme - IV Semester

Course	ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING		
Course Code	20CS4T3	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-	Year of Offering:2021-	Year of Revision:2021-22	Percentage of Revision:

Course Outcomes:

On successful completion of this course, the students:

1. Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.(CO1)
2. ApplyingconceptsofThreads,ProcessSynchronization&CUPScheduling.(CO2)
3. Understand Deadlock, Main Memory & Virtual Memory.(CO3)
4. Explain Mass Storage Structure, File System Interface & File System Implementation.(CO4)
5. Understanding on I/O Systems, Protection & Security.(CO5)

Unit	Learning Units	Lecture Hours
I	**Introduction**- Association, Supervised Learning – Classification – Regression, Unsupervised Learning, Reinforcement Learning.	12
II	**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.	10
III	**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.	14
IV	**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 Neighbour Estimator.	10

V	**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.	14

Prescribed Text Book

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

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 20CS4T3 Title: ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING

Time: 3Hours Max.Marks:70

SECTION-A

2. Answer ALL questions (10x2 = 20 Marks)

a) Define Artificial Intelligence (AI).
b) Define Rational Agent
c) Define Architecture.
d) Define Information Gathering..
e) What is order Logic?
f) Define Forwed Chaining.
g) What is autonomy?
h) Define Classical Planning
i) What is supervised Learning?
j) Define Mental Objects.

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. (5×10=50Marks)

2a)What is AI? Discuss the Heuristic Search Techniques for solving problems.(BTL1)
(or)
b) Discuss Problem Solving Agents with Examples. (BTL6)

3a)Explain the Syntax and Semantics of First Order Logic.(BTL2)
(or)
b)Demonstrate the concept of resolution with an example.(BTL2)

4a)Explain how to design algorithms for Planning as State Space Search. (BTL2)
(or)
b)Discuss Onto logical Engineering in Knowledge Representation.(BTL6)

5a)Describe Learning Decision Trees and Evaluating and Choosing Best Hypothesis.(BTL2)
(or)
b) Explain Policy Search and Applications of Reinforcement Learning.(BTL2)

6a)Discuss the Back Propagation Algorithm, Remarks on the Back Propagation Algorithm.(BTL6)
(or)
b)How does K-Nearest Neighbour Learning help in Instance Based Learning and also state the Importance of Radial Basis Functions.(BTL1)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course	CLOUD COMPUTING		
Course Code	20CS4T4	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision:

Course Outcomes:

On successful completion of this course, the students:

6. Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.(CO1)
7. ApplyingconceptsofThreads,ProcessSynchronization&CUPScheduling.(CO2)
8. Understand Deadlock, Main Memory & Virtual Memory.(CO3)
9. Explain Mass Storage Structure, File System Interface & File System Implementation.(CO4)
10. Understanding on I/O Systems, Protection & Security.(CO5)

Unit	Learning Units	Lecture Hours
I	**Era of Cloud Computing :** Getting to know the cloud - Peer-To-Peer, Client-Server, and Grid Computing – Cloud computing versus Client-server Architecture - Cloud computing versus Peer-To-Peer Architecture - Cloud computing versus Grid Computing - How we got to the Cloud - Server Virtualization versus cloud computing - Components of Cloud computing – Cloud Types – Cloud Computing Service delivery Models. **Introducing Virtualization :** Introducing Virtualization and its benefits – Implementation levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms – 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	12
II	**Cloud Computing Services:** Infrastructure as a Service – Platform as a Service Language and Pass – Software as a Service – Database as a Service. **Open Source Cloud Implementation and Administration:** Open-source Eucalyptus Cloud Architecture – Open-source Openstack Cloud Architecture.	10
III	**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).	14

IV	**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 In adequat 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 .	10
V	**Application Development for cloud :** Developing On-Premise Versus Cloud Applications – Modifying Traditional Applications for Deployment in the Cloud Stages during the development process of Cloud Application - Managing a Cloud Application – Using Agile Software Development for Cloud Applications 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.	14

Prescribed Text Book			
	Author	Title	Publisher
1	Thomas Erl, Zaigham Mahmood, Ricardo	Cloud Computing - Concepts Technology and Architecture	Pearson
2	Raj Kumar Buyya, Christen vecctiola,S Tammarai selvi	Mastering Cloud Computing, Foundations and Application Programming	TMH

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

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – IV Semester

Course Code: 20CS4T4 Title: CLOUD COMPUTING

Time: 3Hours 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. **(5×10=50Marks)**

2.a) Explain virtualization mechanisms

(Or)

b) Write about peer-to-peer network families?

3.a) Explain cloud computing Services?

(or)

b) Explain open-source Eucalyptus Cloud Architecture.

4. a) Explain NOSQL system.?

(or)

b) Explain fundamental requirements for Cloud Application Architecture.

5. a) Explain Authentication management in the cloud?

(or)

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

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

(or)

b) Write about Mobile Cloud Computing Challenges

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M.Sc., (Computer Science) Programme – IV Semester

M.Sc(Cs)	**IV**	**MOOCS**	**20CS4P1**	**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**	**4**
	4	**-**		**30**	**70**	

Course Objectives

The Main Course Objective is to give knowledge for Students on MOOC'S Courses

Course Outcomes

After Studying this Paper Student will acquire knowledge about MOOC's Courses

- The Student has to enroll and complete any one of the **other than Computer Related Course** (4 **Credits Equivalent**) from MOOC's platforms like NPTEL, SWAYAM etc.
- The Student is excepted to submit the above course pass certificate otherwise, the Department of M.Sc. (CS) will conduct the evaluation(as per the prescribed format in the academic regulations) to issue the pass certificate.
- The selection of the course by the student can be done under the supervision of mentor.

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165

(An Autonomous College in the Jurisdiction of Krishna University)Accredited

at the level 'A' by the **NAAC**

Sponsors: Siddhartha Academy of General& Technical Education

DEPARTMENT OF COMPUTER SCIENCE

Minutes of the meeting of Board of Studies in Computer Science for PG (M.Sc.)

Date: 17-11-2022

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE::VUYYURU

(An Autonomous College in the Jurisdiction of Krishna University)
Accredited at the level 'A' by the NAAC
Sponsors: Siddhartha Academy of General & Technical Education

DEPARTMENT OF COMPUTER SCIENCE (PG)

Minutes of the meeting of Board of Studies in Computer Science for M.Sc. (Computer Science) programme held on 17-11-2022 at 11:00A.M. for the Department of Computer Science.

Members Present		
Name of the Member	**Role**	**Signature**
Smt. T.Keerthi, I/C HOD, Dept. of Computer Science, A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru-521165. Mobile: 9959558485 E-Mail: keerthitatineni16@gmail.com	Chairman	
Dr. K.Madhavi, Associate Professor, Dept of Computer Science, JNTUA. College of Engineering,Anantapur. Mobile: 9440206501 E-Mail:kasamadhavi@yahoo.com	University Nominee, Krishna University	
Dr.R.Satya Prasad, Professor, Department of Computer Science, Acharya Nagarjuna University, Nagarjuna Nagar-522508. Mobile: 9848487478 E-Mail: profrsp@gmail.com	Subject Expert	
Dr.T.S.Ravi Kiran, H.O.D& Assistant Professor, Dept of Computer Science, P.B. Siddhartha Degree College of Arts & Science-Vijayawada -520002. Mobile: 9441176980 E-Mail: kirantsr1 @gmail.com	Special Invitee	
Sri.U.Sairam,C.E.O, Codegnan I.T Solutions OPC PVT LTD., Vijayawada520002 Mobile:9959555952 E-Mail: uppugundlasairam@gmail.com	Industrialist	
Ms. P.Srujana, Software Developer, TonmetriInfoSolutions,Vijayawada. Mobile: 9032671688 E-Mail:srujanapaladugu26@gmail.com	Alumni Representative	
Smt. V. Munni, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile: 8099205522 E-Mail:munni.j2ee@gmail.com	Member	
Sri.B.MadhuSudhana Rao, Assistant Professor, A.G & S.G Siddhartha Degree College of Arts & Science. Mobile:7842664766 E-Mail:ms.madhu27@gmail.com	Member	

PG

AGENDA

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *First* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2022-2023 and onwards.

- To discuss and approve the *Structure, Syllabi and Model Question Papers* of *Third* Semester of M.Sc.(Computer Science) for the batch of students admitted from the academic year 2022-2023 and onwards.

RESOLUTIONS

- Resolved and recommended to continue the same syllabus, model papers without changes in the First Semester for the following courses:
  - Formal languages & Automata Theory (22CS1T3)
  - Data Base Management System Lab (22CS1L2)

- Resolved and recommended to introduce new syllabus, model papers in the First Semester for the following courses:
  - Programming & problem Solving using Python (22CS1T1)
  - Data Base Management System (22CS1T2)
  - Operating System (22CS1T4)
  - Python Lab (22CS1L1)

- To discuss and approve the *Structure*, S*yllabi* and *Model Question Papers* of Open Electives *"Personality Development Through Life Enlighten Skills"* for First Semester

- Resolved and recommended to continue the same syllabus, model papers without changes in the Third Semester for the following courses:
  - Design & Analysis Of Algorithm (22CS3E1)
  - Internet Of Things (22CS3E5)
  - Cryptography & Network Security (22CS3E3)
  - Data Mining Techniques (22CS3E2)

- Resolved and recommended to introduce new syllabus, model papers in the Third Semester for the following courses:
  - Web Technologies Lab (20CS3L1)
  - Cryptography & Network Security Lab (22CS3L2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme – I Semester

Course	Programming and Problem Solving Using Python		
Course Code	22CS1T1	Course Delivery Method	Class Room /
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose: Python Programming is a course that illustrates basic concepts of Python programming, Decision Control Statements, Functions and Modules, Python Strings Revisited, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, File Handling,Numpy, Matplotlib.

Course Objectives:

This course will help enable the students to understand, learn and develop a various Decision Control Statements, Functions & Modules, Strings, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, Handling Files, Databases.

Specific objectives include:

- To understand basics of *Python Programming*.
- To gain knowledge on *Decision Control Statements* and *Functions & Modules and Python Strings* and *DataStructures*.
- To gain knowledge on *Classes & Objects, Ingeritance.*
- To apply *Operator Overloading*, *Error and Exception Handling* and Pandas.
- To gain knowledge on File Handling, Database Connection, basics of Numpy and matplotlib.

Course Learning Outcomes:

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

- Understand basics of Python Programming.
- Gain knowledge on *Decision Control Statements* and *Functions & Modules* and *Python Strings* and *DataStructures*.
- Gain knowledge on *Classes & Objects & Inheritance.*
- Apply Operator Overloading, Error and Exception Handling and Pandas.
- Gain Knowledge on File Handling, Database Connection and basics of Numpy and matplotlib

Unit	Learning Units	Lecture Hours
I	**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. **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.	15
II	**Functions and Modules:** Function Definition, Function Call, Variable Scope and Lifetime, The Return Statement, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Standard Library Modules. **Python Strings Revisited:** Concatenating, Appending and Multiplying Strings, String Formatting Operator, Built in String Methods and Functions, Comparing Strings, Regular Expressions. **Data Structures:** Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.	15
III	**Classes and Objects:** Classes and Objects, Class Method and self Argument, Class Variables and ObjectVariables, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built in Class Attributes, Class Methods, Static Methods. **Inheritance:** Inheriting Classes in Python, Types of Inheritance, Abstract Classes and Interfaces.	15
IV	**Operator Overloading:** Concept of Operator Overloading, Advantage of Operator Overloading, Implementing Operator Overloading. **Pandas:** Introduction, Getting Started, Series, Data Frame**,** Read CSV, Read JSON -Analyzing Data Frames, Cleaning Data, Cleaning Empty Cell, Cleaning Wrong Format, Cleaning Wrong Data, Removing Duplicates, Correlations, Plotting. **Error and Exception Handling:** Introduction to Errors and Exceptions, Handling Exceptions, Raising Exceptions, Built in and User defined Exceptions.	15
V	**File Handling:** File Path, Types of Files, Opening and Closing Files, Reading and Writing Files. **Databases:** Database Table Creation, Select Operation, Insert Operation, Delete Operation, Update Operation,Drop Table. **Numpy:** Basic Functions of Numpy. **Matplotlib:** Basic Functions of Matplotlib.	15

Prescribed Text Book			
	Author	Title	Publisher
1	Reema Thareja	Python Programming Using Problem Solving Approach	Oxford University Press, June 2017.
Reference Text Book			
1	Vamsi Kurama	Python Programming, A Modern Approach	Pearson, 2017
2	Wesley Chun	Core Python Programming	Prentice Hall, December 2000
e-resources: https://www.w3schools.com/python/pandas/			

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computer Science), First Semester

Course Name: PROBLEM SOLVING USING PYTHON PROGRAMMING

Course Code: 22CS1T1

(w.e.f admitted batch 2022-23)

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

SECTION-A

Answer ALL questions **(5×4 = 20 Marks)**

1. a) Explain *Future of Python* (BTL2)

   (OR)

   b) Explain different *Data Types* in *Python* (BTL2)
2. a) What is *Recursive Function*? Explain with *example*.(BTL1)

   (OR)

   b) List out and explain any *4 Built in String Method*?(BTL1)
3. a) Whit is the *Differences between Class Variable and Object Variable*?(BTL1)

   (OR)

   b) List out *Built in Class Attributes*? (BTL1)
4. a) Explain *Advantages of Operator Overloading*? (BTL2)

   (OR)

   b) Explain *Exception Hierarchy*? (BTL2)
5. a) Explain *Types of Plots in Matplotlib*? (BTL2)

   (OR)

   b) Explain different *ways of creating Arrays* using *Numpy*. (BTL2)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10 = 50 Marks)**

UNIT – I

6. A) Explain the *features of Python Programming Language.*(BTL2)

   (OR)

   B) Explain *Different Loops* in Python with example. (BTL2)

UNIT – II

7. A) Apply *Modules Concept in Python with examples*. (BTL3)

   (OR)

   B) Build the List *Data Structure and their built in functions* with examples. (BTL3)

UNIT – III

8. A) What are *Classes and Objects*? Write a program in Python to illustrate an *instancevariable*. (BTL1)

   (OR)

   B) What is *Inheritance*? Explain *different types of Inheritance.* (BTL1)

UNIT – IV

9. A) Explain how to *Implement Operator Overloading* in Python. (BTL2)

   (OR)

   B) Explain *process of Analyzing Data Frames*. (BTL2)

UNIT – V

10. A) Explain *process of Writing and Reading data from file with example*. (BTL5)

    (OR)

    B) Explain process of *Update Data* into *Database* with *relevant examples*. (BTL5)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – I Semester

Course	Programming and Problem Solving Using Python Lab		
Course Code	22CS1L1	Course Delivery Method	Class Room /
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Python Programming is a course that illustrates Basic Concepts of Python programming, Decision Control Statements, Functions and Modules, Python Strings Revisited, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, File Handling, Numpy, Matplotlib.

Course Objectives:

This course will help enable the students to understand, learn and develop a various Decision Control Statements, Functions & Modules, Strings, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, Handling Files, Databases.

Specific objectives include:

- To understand *Basics of Python Programming*, *Decision Control Statements*.
- To know the concepts *of Data Structures*, *Functions and Modules*.
- To know the concepts of *Classes and Objects*, *Object Oriented Programming*.
- To apply *Error and Exception Handling*.
- To implement *Database Access* and *File Handling*.

Course Learning Outcomes:

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

- Understand *Basics of Python Programming, Decision Control Statements*.
- Know the concepts of *Data Structures, Functions and Modules*.
- Know the concepts of *Classes and Objects, Object Oriented Programming*.
- Apply *Error and Exception Handling*.
- Implement *Database Access* and *File Handling*.

LAB LIST

1. Write a program to find total for given number of tens, number of fives, number of twos and number of ones.
2. Write a program to enter a number and display its hex and octal equivalent and its square root.
3. Write a program to read and print values of variables of different data types.
4. Write a program to calculate the distance between two points.
5. Write a program to calcuate area of troangle using

   Heron's formula.(Hint: Heron's formula is given as:

area=sqrt(S*(S-a)*(S-b)*(S-c))).

6. Write a program to calculate the distance between two points.
7. Write a program to perform addition, subtraction, multiplication, division, integer division.
8. Write a program to find the greatest number from three numbers.
9. Write a program to calculate tax given the following conditions:If income is less than 1, 50, 000 then no tax

   If taxable income is Rs.1, 50, 001, Rs.300, 000 then charge 10% tax

   If taxable income is Rs.3, 00, 001, Rs.500, 000 then charge 20% tax

   If taxable income is above Rs.5, 00, 001 then charge 30% tax

10. Write a program to calculate roots of quadratic equcation.
11. Write a program to enter the marks of a student in four subjects. Then calculate the total and aggregate, and display the grade obtained by the student. If the student scores an aggregate garter than 75%, then the grade is Distinction. If aggregate is 60>= and <75, then grade is First Division. If the aggregate is 50>= and <60, then the grade is Second Division. If aggregate is 40>= and <50, then the garde is Third Division. Else the grade is Fail.
12. Write a program to read the numbers until -1 is encountered. Find the average of positive numbers and negative numbers entered by the user.
13. Write a program to find whether the given number is an *Amstrong Number* or *not*.
14. Write a program to enter a Decimal Number. Calculate and display its Binary Equivalent.
15. Write a program to demonstrate List Operations.

- Access List Items
- Change Item Value
- Appended Items
- Remove Specified Item
- Loop Through a List
- List Comprehension
- Sort List Alphanumerically
- Copy a List
- Join Two Lists
- List Methods

16. Write a program to demonstrate Tuple Operations.

- Access Tuple Items
- Negative Indexing
- Range of Indexes
- Range of Negative Indexes
- Check if Item Exists
- Update Tuples
- Add Items
- Remove Items
- Unpacking a Tuple
- Using Asterisk*
- Loop Through a Tuple
- Loop Through the Index Numbers

- Using a While Loop:
- Python, Join Tuples
- Join Two Tuples
- Multiply Tuples

17. Write a program to demonstrate Set Operations.

- Access Set Items
- Add Set Items
- Loop Sets
- Join Two Sets
- Keep ONLY the Duplicates
- Keep All, But NOT the Duplicates

18. Write a program to demonstrate Dictionary Operations.

- Ordered or Unordered?
- Changeable
- Duplicates Not Allowed
- Accessing Items
- Change Values
- Update Dictionary
- Adding Items
- Remove Dictionary Items
- Loop Through a Dictionary
- Copy a Dictionary
- Nested Dictionaries

19. Write a program to enter a number and then calculate the *Sum of its Digits*.

20. Write a program to print the *Reverse Number*.

21. Write a program to calculate GCD of two numbers.

22. Write a program that prompts users to enter numbers. The process will repeat until user enters -1. Finally, theprogram prints the count of prime and composite numbers entered.

23. Write a program

a) To calculate the factorial of number recursively.

b) To calculate GCD using the recursive functions.

24. Write a program

c) To calculate exp(x, y) using recursive functions

d) To print the Fibonacci Series using Recursion.

25. Write a program make a *Simple Calculator*.

26. Write a program that defines a function large in a module which will be used to find large of two values andcalled from a code in another module.

27. Write a program that demonstrate the use of method___*init*____.

28. Write a program to illustrate the modification of instance variable.

29. Write a program for modifying a mutable type attribute.

30. Write a program to demonstrate the use of inheritance.

31. Write a Program to demonstrate Polymorphism.

32. Write a program to demonstrate Polymorphism using Function Overloading.

33. Write Program to demonstrate Method Overriding with arguments.

34. Write a python program to demonstrate multilevel inheritance.

35. Write a program to demonstrate Multipath Inheritance (or) Hybrid Inheritance.

36. Write a program to demonstrate Multi Level Inheritance (A person is teacher & having designation HOD)

37. Write a program to demonstrate *Multi-Path Inheritance*.

38. Write a program to illustrate the concept of Abstract Class.

39. Write a program to overload the + operator on a complex object.

40. Write a program to handle Divide by Zero Exception.

41. Write a program to handle Multiple Errors with One Except statement.

42. Write a program with Multiple Except Blocks.

43. Write a program to demonstrate else statement in exception handling.

44. Write a python program to illustrate the *try...catch...finally* in exception handling.

45. Write a program to demonstrate Regular Expression Functions.

- findall()
- Search
- Split
- sub()

46. Write a program Demonstrate Regular Expression Meta Characters.

- Python program to match string using metacharacter []
- Program to find digits in character using metacharacter \
- Program for sequence that starts with "he", followed by two (any) characters using metacharacter ..
- Program to check if the string starts with 'hello' using metacharacter ^
- Program to check the string ends with 'world' using metacharacter $
- Program to check the string contains "ai" followed by 0 or more "x" characters
- Program to check the string contains "ai" followed by 1 or more "x" characters
- Program to check if the string contains "a" followed by exactly two "l" characters
- Program to check if the string contains either "falls" or "stays" using meta character |

47. Write a program to demonstrate Regular Expression Sequences.

- Program to check if the string starts with "The"
- Program to check if "ain" is present at the begining of a word
- Program to check if "ain" is present at the end of a word.
- Program to check if "ain" is present, but NOT at the begining of a word.
- Program to check if "ain" is present, but NOT at the end of a word.
- Program to Check if the string contains any digits (numbers from 0-9).
- Program to return a match at every no-digit character.

- Program to return a match at every white-space character.
- Program to return a match at every NON white-space character.
- Program to return a match at every word character (characters from a to Z, digits from 0-9, and theunderscore _ character)
- Program to return a match at every NON word character (characters NOT between a and Z. Like "!", "?"white-space etc.)
- Program to check if the string ends with "Spain".

48. Write a program to demonstrate Regular Expression Sets.

- Program Check if the string has any a, r, or n characters.
- Program to Check if the string has any characters between a and n.
- Program to Check if the string has other characters than a, r, or n.
- Program to check if the string has any 0, 1, 2, or 3 digits.
- Program to check if a string has any digits.
- Program to check if the string has any two-digit numbers, from 00 to 59.
- Program to Check if the string has any characters from a to z lower case, and A to Z upper case.
- Program to check if the string has any + characters.

49. Write a program to

- Create EMP table with attributes ENO, ENAME and ESAL into PBS database.
- Insert rows into EMP table of PBS database.
- Update rows of EMP table of PBS database.
- Delete rows from EMP table of PBS database.
- Drop EMP table of PBS database.

50. Write a program to open the file and count the number of times a character appears in the file.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science)Programme – I Semester

Course	Database Management Systems		
Course Code	22CS1T2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Database Management Systems is a course that illustrates basic concepts of *Databases and Database Users*, *Database System Architecture*, *ER & EER Relationship Modeling*, *Structured Query Language*, *Relational Algebra and Relational Calculus*, *Functional Dependencies and Normalization for Relational Databases*, *Transaction Processing Concepts*, *Concurrency Control Techniques* and *Emerging Database Technologies and Applications.*

Course Objectives:

This course will help enable the students to understand, learn and develop a various *Relational Data Models*, Querying, ER *& EER Modeling*, *Relational Algebra & Calculus*, *Functional Dependencies and Normalization*, *Transaction Processing*, *Concurrency Control* and *Emerging Database Technologies and Applications.*

Specific objectives include:

- To understand basic concepts of *Database and Database Users, Database Architecture*.
- To understand *ER, EER Modelling* and *Relational Algebra and Relational Calculus*.
- To learn the basics of *Functional Dependencies and Normalization* for Relational Databases.
- To learn *Transaction Processing* and *Concurrency Control Techniques*.
- To understand the *Structured Query Language* and *Emerging Database Technologies* and Applications:

Course Learning Outcomes:

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

- Understand basic concepts of *Database and Database Users, Database Architecture*.
- Understand *ER, EER Modeling* and *Relational Algebra and Relational Calculus*.
- Learn the basics of *Functional Dependencies and Normalization* for Relational Databases.
- Learn *Transaction Processing* and *Concurrency Control Techniques*.
- Understand the *Structured Query Language* and *Emerging Database Technologies and Applications*.

Unit	Title	Lecture Hours
I	**Database 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.	15
II	**Data Modeling Using the ER Model:** Conceptual Data Models, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database. **The Enhanced Entity-Relationship Model:** Sub Classes, Super Classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization. **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	15
III	**Functional Dependencies and Normalization for Relational Databases:** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies.	15
IV	**Introduction to Transaction Processing Concepts and Theory:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules based on Serializability. **Concurrency Control Techniques:** Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation Concurrency Control Techniques.	15
V	**SQL-99:** Schema Definition, Constraints, Queries and Views: SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views. **Emerging Database Technologies and Applications:** Mobile Databases, Multimedia Databases, Geographic Information Systems.	15

Prescribed Text Book

	Author	Title	Publisher
1	Ramez Elmasri, Shamkant B. Navathe	Fundamentals of Database Systems	Pearson Education, SeventhEdition, 2017
2	C.J.Date, A.Kannan, S.Swamynathan	An Introduction to Database Systems	VII Edition, PearsonEducation , 2006.
3	Peter Rob, Carlos Coronel	Database Systems-Design, Implementation and Management	Eight Edition,Thomson, 2008

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computer Science), First Semester

Course Name: Database Management Systems **Course Code:** 22CS1T2

(w.e.f admitted batch 2022-23) Time: 3 Hours Max Marks: 70

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1(a) Name the advantages of the DBMS. (BTL1)

(or)

(b) What is Data Independence? Explain the difference between *Physical Data Independence* and *Logical Data Independence*. (BTL1)

2 (a) What is *Generalization*? Explain it diagram. (BTL1)

(or)

(b) What are various symbols used in *ER Modeling*. (BTL1)

3 (a) Explain *First Normal Form*. (BTL2)

(or)

(b) Explain *Dependency Preservation* with example. (BTL2)

4 (a) Explain *Properties of Transaction.* (BTL2)

(or)

(b) Explain *Shared* and *Exclusive* Locks. (BTL2)

5 (a) Explain *DML Commands* with example. (BTL5)

(or)

(b) Explain *Mobile Databases*. (BTL5)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6 (a) Explain various *Data Models* of Database Management Systems. (BTL2)

(or)

(b) Explain *Three Schema Architecture* of DBMS with neat diagram. (BTL2)

7 (a) Demonstrate *Select* and *Project* operations of *Relational Algebra*. (BTL2)

(or)

(b) Explain *ER Design* for the *Company Database* with all constraints. (BTL2)

8 (a) Explain *BCNF* with example. (BTL5)

(or)

(b) Explain *Fifth Normal Form* with example.(BTL5)

9 (a) Identify whether the transactions T1 & T2 ensure *serializability*. (BTL3)

T1	T2
read_item (X) ;	read_item(X);
X:=X – N;	
	X:=X +

or)

(b) Develop a technique for *Concurrency Control Based on Timestamp Ordering.* (BTL3)

10 (a) Analyze *Multimedia Databases* in detail. (BTL4)

(or)

(b) Distinguish various *Constraints* of SQL. (BTL4)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc., (ComputerScience)Programme – I Semester

Course	Database Management Systems Lab		
Course Code	22CS1L2	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Description and Purpose:

Database Management Systems Laboratory is a course that illustrates *DDL and DML Commands*, *Basic SQL Queries*, *Complex SQL Queries*, *Joins*, *Integrity Constraints*, *Views*, *Cursors*, *Triggers*, and *Functions andProcedures using PL/SQL*.

Course Objectives:

This course will help enable the students to understand, learn and practice develop a various *Relational Data Models*, *Querying*, *DDL and DML Commands*, *Basic SQL Queries*, *Complex SQL Queries*, *Joins*, *Integrity Constraints*, *Views*, *Cursors*, *Triggers*, and *Functions and Procedures* using PL/SQL.

Specific objectives include:

1. Database creation using DDL Commands.
2. Retrieval of Data from database using DML Commands for a given situation.
3. Use SQL commands familiarizing with a Query Language.
4. Using Nested Queries, Joins, Integrity Constraints and Views in database.
5. Demonstrating Triggers, Functions and Procedures using PL/SQL.

Course Learning Outcomes:

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

1. Create database using *DDL Commands*.
2. Retrieve data from database using *DML Commands* for a given situation.
3. Familiarize with a Query Language through basic SQL Queries.
4. Experiment *Nested Queries*, *Joins*, *Integrity Constraints* and *Views* in database.
5. Demonstrate *Triggers*, *Functions* and *Procedures* using PL/SQL.

CYCLE-I

Aim: Marketing Company wishes to computerize their operations by using following tables.

Table Name: Client- Master			
Column Name	Data Type	Size	Attribute
CLIENT_ NO	Varchar2	6	Primary key and first letter must start with
NAME	Varchar2	20	Not null
ADDRESS 1	Varchar2	30	
ADDRESS S	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
AL_DUE	Number	10,2	

Table Name: Product_ Master			
Column Name	Data Type	Size	Attribute
PRODUCT _NO	Varchar2	6	Primary key and first letter must start with
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			
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			
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",

Table Name: Sales_Order_Details			
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

S

ve 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,2018.

CYCLE-II

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables torecord 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)

Solve the following queries by using above tables.

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 S1.
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 P2.
9. Get all pairs 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

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)

Solve the following queries by using above tables.

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).

CYCLE-IV

An Airline system would like to keep track their information by using the following relations.

FLIGHTS(fl_no: integer, from: string, to: string, distance: integer, price: integer) AIRCRAFT(aid: integer, aname: string, cruising_range: integer) CERTIFIED(eid integer, aid: integer) Employees(eid: integer, ename: string, salary: real)

Note that the employees relation describes pilots and other kinds of employees as well; every pilot is certified foraircraftand only pilots are certified to fly. Resolve the following queries.

a. Find the names of pilots whose salary is less than the price of the cheapest route from Newyork to Chicago.
b. For each pilot who is certified for more than 2 aircraft, find the eid's and the maximum cruising range of the aircraft that heor she certified for.
c. For all aircraft with cruising range over 1,500 miles, find the name of the aircraft and the average salary of all pilots certifiedfor this aircraft.

d. Find the aid's of all aircraft than can be used from chicaga to LosAngels.
e. Find the name of the pilots certified from some Boeing aircraft.
f. Print the enames of pilots who can operate planes with cruising range greater than 3,500 miles, but are not certified byBoeing aircraft.
g. Find the eid's of employees who are certified for exactly 2 aircrafts.
h. Find the total amount paid to employees as salaries.
i. Find the aid's of all than can be used on non-stop flights from Chennai to Dubai.
j. Find the eid's of employee who make second highest salary.

PL/SQL PROGRAMS

1. Write a PL/SQL program to check the given number is strong or not.
2. Write a PL/SQL program to check the given string is palindrome or not.
3. Write a PL/SQL program to swap two numbers without using third variable.
4. Writ a PL/SQL program to generate multiplication tables for 2, 4, 6.
5. Write a PL/SQL program to check the given number is Amstrong or not.
6. Write a PL/SQL code to find the factorial of any number.
7. Write a PL/SQL program to display sum of even numbers and sum of odd numbers in the given range.
8. Write a PL/SQL program to check the given number is palindrome or not.
9. The HRD manager has decide to raise the employee salary by 15% write a PL/SQL block to accept the employee numberand update the salary of that employee. Display appropriate message based on the existence of the record in Emp table.
10. Write a PL/SQL program to display to 10 rows in Emp table based on their job and salary.

11. Write a PL/SQL program to raise the employee salary by 10% for department number 30 people and also maintain theraised details in the raise table.
12. Write a procedure to update the salary of Employee, who are not getting commission by 10%.
13. Write a PL/SQL procedure to prepare an electricity bill by using following table.

Table used: Elect		
Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_ UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_ TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

14. Write a PL/SQL program to prepare an telephone bill by using following table and print the monthly bills for eachcustomer.

Table used: Phone		
Name	Null?	Type
TEL_NO	NOT NULL	NUMBER(6)
CNAME		VARCHAR2(20)
CITY		VARCHAR2(10)
PR_READ		NUMBER(5)
CUR_READ		NUMBER(5)
NET_AMT		NUMBER(5)
TOT-AMT		NUMBER(8,2)

15. Write a PL/SQL program to raise the employee salary by 10 %, who are completed their 25 years of service and store thedetails at appropriate tables (Define the Retair_ Emp_Table).
16. Write a PL/SQL program to evaluate the grade of a student with following conditions: For pass: all marks > 40For I class: Total % > 59 For II Class: Total % etween >40 and < 60 For III class: total % = 40And also maintain the details in abstract table.

1. Table Std		
Name	Null?	Type
NO	NOT NULL	NUMBER
NAME		VARCHAR2(10)
INTNO		NUMBER
CLASS	NOT NULL	VARCHAR2(10)
M1		NUMBER
M2		NUMBER
M3		NUMBER
M4		NUMBER
M5		NUMBER

2. Table Abstract		
Name	Null?	Type
STDNO		NUMBER
STDNAME		VARCHAR2(10)
CLASS		VARCHAR2(10)
MONTH		VARCHAR2(10)
INTNO (INTEGER NUMBER)		NUMBER
TOT		NUMBER
GRADE		VARCHAR2(10)
PERCENT		NUMBER
DAT_ENTER		DATE

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme - I Semester

Course	Formal Languages and Automata Theory		
Course Code	22CS1T3	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:**2020-21**	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision:0%

Course Description and Purpose:

Formal Languages and Automata Theory deals with the concepts of *Automata, Formal Languages, Grammar, Algorithms, Computability, Decidability and Complexity*. It also helps to develop methods by which computer scientists can describe and analyze the dynamic behavior of *Discrete Systems*, in which signals are sampled periodically.

Course Objectives*:*

- To understand basic properties of *Deterministic* and *Nondeterministic Finite Automat.*
- To understand *Context Free Languages* and *Grammers*, and also *Normalising CFG*.
- To understand the concept of *Pushdown Automata Turing Machine* and its application.
- To understand Basic Structure of *Compiler Design*.
- To understand the concept of *Lex* and *Syntax Analysis.*

Course Learning Outcomes:

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

- Understand basic properties of *Deterministic* and *Nondeterministic Finite Automat.*
- Understand the *Context Free Languages* and *Grammers*, and also *Normalising CFG*.
- Understand the concept of *Pushdown Automata Turing Machine* and its application.
- Understand Basic Structure of *Compiler Design.*
- Understand the concept of *Lex* and *Syntax Analysis.*

Unit	Learning Units	LectureHours
	Fundamentals: Strings, Alphabet, Language, Operations, Finite Automaton Model, Acceptance of Strings and Languages, Transition Table and Transition Diagrams. **Finite Automata:** Deterministic Finite Automaton, Non deterministic Finite Automaton and NFA with ε Transitions, Significance, 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.	15
II	**Regular Languages:** Regular Sets, Regular Expressions, Identity Rules, Construction of Finite Automata(DFA) for a given Regular Expressions and its inter conversion using State Elimination and Ardens Theorem, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets (Proofs not required).	15
III	**Context free grammar:** Introduction, Derivation Trees, Ambiguity in Context Free Grammars. Minimization ofContext Free Grammars. Chomsky Normal Form, Greibach Normal Form. **Push down Automata:** Definition, M odel, D esign of PDA. The Language of PDA- Acceptance by Final State, Acceptance by Empty Stack ,Equivalence of CFL and PDA -Conversion of CFL to PDA and PDA to CFL **Turing Machine:** Definition, Turing Machine Model, Types of Turing machine (problems not required),Types of Turing machine ,Recursively Enumerable Languages and Recursive Languages Chomsky Hierarchy ofLanguages and Post correspondence problem.	15
IV	**Compiler**: Introduction, Structure of a compiler, Design issues of compiler, Phases of Compiler, Lexical Analysis, Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition	15
V	**Lex (Lexical-Analyzer Generator):** Uses of Lex, Structure of Lex Programs, Conflict Resolution in Lex , TheLookahead Operator.**Syntax Analysis:** Top Down Parsing, Recursive-Descent Parsing, FIRST and FOLLOW, LL(l) Grammar,Nonrecursive Predictive Parsing, Error Recovery in Predictive Parsing. Bottom-Up Parsing- Reductions, Handle Pruning, Shift-Reduce Parsing ,Conflicts During Shift-Reduce Parsing.	15

Prescribed Text Book

	Author	Title	Publisher
1	Hopcroft. H.E. and Ullman	Introduction to Automata Theory Languages and Computation	J. D. Pearson Education, January
1	Jeffery D.Ullman	Compilers-Principles, Techniques and Tools	2nd Edition, Pearson Education, January
	John C Martin	Introduction to Languages and the Theory of Computation	Tata McGraw-Hill, 2003

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
M.Sc.,(COMPUTER SCIENCE) DEGREE EXAMINATIONS
FIRST SEMESTER
FORMAL LANGUAGES AND AUTOMATA THEORY
SYLLABUS W.E.F 2022-2022 (R22)

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

SECTION-A
Answer any five questions. 5 × 4 = 20 Marks

1. (a) What is NFA with example?(BTL1)
(OR)
(b) Define Mealy Machine with example (BTL1)

2. (a) Define regular set .What are the closure properties of regular sets? (BTL1)
(OR)
(b) Define Expression. What are the different identity rules used in regular expression. (BTL1)

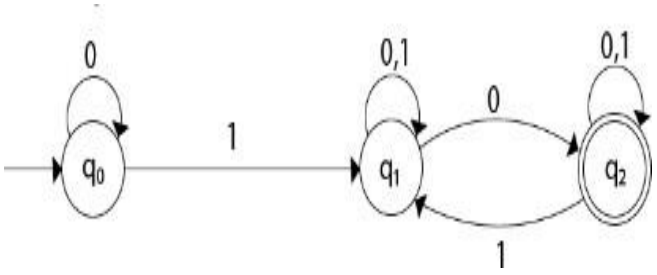
3. (a) Explain Ambiguity in context free grammars with example.(BTL2)
(OR)
(bExplain LMD and RMD with example(BTL2)

4. (a) Define input buffering with example. (BTL1)
(OR)
(b) What is the role of Lexical Analyzer(BTL1)

5. (a) Explain Conflict Resolution in Lex(BTL2)
(OR)
(b) Explain error recovery in predictive parsing. (BTL2)

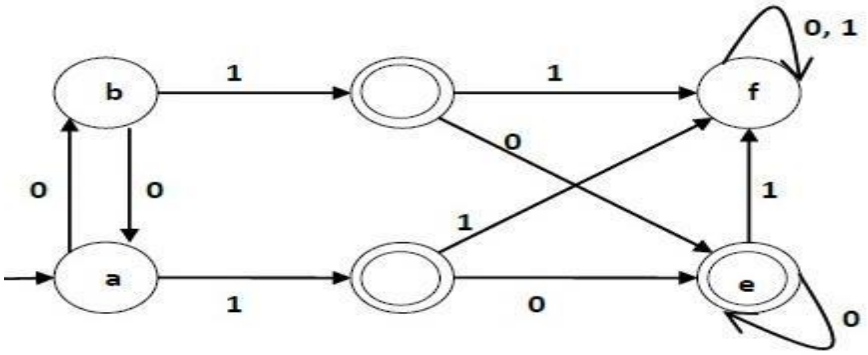
SECTION-B
Answer all questions. 5 × 10 = 50 Marks

6. (a) Construct the given NFA to DFA. (BTL3) 10 Marks

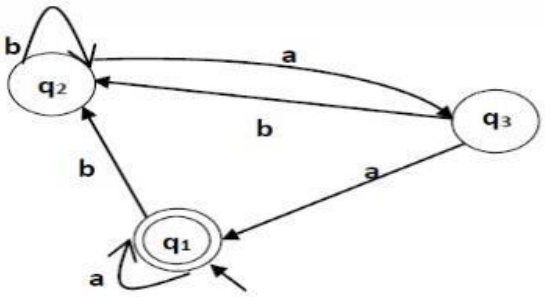


(OR)

(b) Construct the given DFA into minimized DFA (BTL3)



7. (a) Construct a regular expression corresponding to the automata given below (BTL3)



(OR)

(b) Solve the given Language $L= \{0^n 1^n \mid n \geq 1\}$ is not a regular language using pumping lemma (BTL3)

8. (a) Translate the given grammar to CNF (BTL2)

$S \rightarrow aAD$

$A \rightarrow aB / bAB$

$B \rightarrow b$

$D \rightarrow d$

(OR)

(b Explain Chomsky Hierarchy of Languages and Post correspondence problem with example.(BTL2)

9. (a) what are the design issues of compiler?

(OR)

(b) What are the different phases used in Complier Design with diagram 10 Marks (BTL1)

10. (a) Define Lex. explain structure of Lex program and its uses(BTL2)

(or)

(b) Explain top down and bottom up parsing with example(BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme - I Semester

Course	OPERATING SYSTEMS		
Course Code	22CS1T4	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:**2020-21**	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision:100%

Course Description and Purpose:

Operating Systems is a course that illustrates *Operating System Concepts*, *Operating System Structure*, *Processes Concepts*, *Threads*, *Process Synchronization*, *Scheduling*, *Deadlocks*, *Main Memory*, *Virtual Memory*, *Mass Storage Structure*, *File System Implementation*,. *Distributed Operating Systems* and *Mobile & Android Operating Systems*

Course Objectives:
This course will help enable the students to understand and learn *Operating System Concepts*, *Operating Structure*, *Process Concepts*, *Thread Concept*, *Process Synchronization*, *Scheduling*, *Deadlocks*, *Main Memory*, *Virtual Memory and Mass Storage Structure*, *File System Implementation*, *Distributed Operating Systems* and *Mobile & Android Operating Systems*.

Specific objectives include:

- To understand the *Basic Concepts of Operating System, Operating System Structure and ProcessConcept*.
- To apply concepts of *Threads*, *Process Synchronization & CUP Scheduling*.
- To understand *Deadlock, Main Memory & Virtual Memory*.
- To explain *Mass Storage Structure*, *File System Interface & File System Implementation*.
- To understand the concepts of *Distributed Operating Systems* and *Mobile & Android OperatingSystems*.

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

- Understand the Basic Concepts of Operating System, Operating System Structure and ProcessConcept.
- Applying concepts of Threads, Process Synchronization & CUP Scheduling.
- Understand Deadlock, Main Memory & Virtual Memory.
- Explain Mass Storage Structure, File System Interface & File System Implementation.
- Understand the concepts of Distributed Operating Systems and Mobile & Android Operating Systems.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Introduction to Operating System Concepts:** Functions of Operating System, Operating System Structure,Operating System Operations, Kernel Data Structure, Computing Environment. **Operating System Structures:** Operating System Services, System Calls, Types of System Calls. **Processes:** Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication,Communication in Client-Server Systems.	15
II	**Threads:** Overview, Multicore Programming, Multithreading Models, Thread Libraries, ImplicitThreading, Threading Issues. **Process Synchronization:** Background, The Critical Section Problem,Peterson's Solution,Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling,Multiple Processor Scheduling.	15
III	**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, DeadlockPrevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **Main Memory:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of thePage Table, Intel 32 and 64-bit Architectures. **Virtual Memory:** Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation ofFrames,Thrashing.	15
IV	**File System Interface:** File Concept, Access Methods, Directory and Disk Structure, File SystemMounting, Protection. **File System Implementation:** File System Structure, File System Implementation, Directory Implementation,Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.	15
V	**Distributed Operating Systems:** Types of Network based Operating Systems, Network Structure, NetworkTopology, Communication Structure, Communication Protocols, Robustness, Design Issues. **Mobile & Android Operating Systems:** A review of Mobile Operating Systems, Features of Android OperatingSystems.	15

Prescribed Text Book

	Author	Title	Publisher
1	Abraham Silberschatz & PeterBaer Galvin, Greg	Operating System Concept	Ninth Edition, Wiley, 2015

Reference Text Books

	Author	Title	Publisher
1	William Stallings	Operating Systems-Internals and Design Principles	Fifth Edition, Pearson Education,2007
2	Achyut S Godbole	Operating Systems	Second Edition, TMH, 2007

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computer Science), First Semester

Course Name: Operating Systems

Course Code: 22CS1T4

(w.e.f admitted batch 2022-22)

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

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1.(a) Explain the structure of Operating System. (BTL2)

(or)

(b) Explain *Inter Process Communication.* (BTL2)

2 (a) List various *Multithreading Model*. (BTL1)

(or)

(b) What is *Semaphore*. (BTL1)

3 (a) Test for *Demand Paging.* (BTL4)

(or)

(b) Analyze Paging. (BTL4)

4 (a) Demonstrate the *File Concept* (BTL2)

(or)

(b) Explain various *File Operations*. (BTL2)

5 (a) Construct a *Network Topology.* (BTL3)

(or)

(b) Identify the design issues in *Distributed OS*. (BTL3)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6 (a) Explain *Operating System Services*. (BTL2)

(or)

(b) Explain various types *System Calls*. (BTL2)

7 (a) Illustrate the *Dining Philosophers Problem* of Process Synchronization. (BTL2)

(or)

(b) Demonstrate (BTL2)

(i) First-Come, First-Served Scheduling with the following data

Process	Burst Time
P1	24
P2	3
P3	3

(ii) Shortest-Job-First Scheduling with following data

Process	Burst Time
P1	6
P2	8
P3	7
P4	3

8 (a) Apply the necessary conditions for preventing *Deadlock Situation.* (BTL3)

(or)

(b) Utilize the reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames implement *Optimal Page Replacement* and *LRU PageReplacement*. (BTL3)

9 (a) Compare *Single-Level Directory*, *Two Level Directory*, and *Tree-Structured Directories*. (BTL4)

(or)

(b) Categorize various *Allocation Methods* of *File System Implementation*. (BTL4)

10 (a) Explain various types of *Network based Operating Systems*. (BTL5)

(or)

(b) Explain features of *Mobile Operating Systems*. (BTL5)

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M.Sc., (Computer Science)Programme - I Semester

Course	**Personality Development through Life Enlightenment skills**		
Course Code	22PG101	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: **2022-23**	Year of Offering: **2022-23**	Year of Revision: **2022-23**	Percentage of Revision: 0%

Course Description and Purpose:

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

Course Objectives:

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

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

Course Learning Outcomes:

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

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

UNIT- I :

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

UNIT- II:

Attitude. Motivation and Self-esteem

Conceptual overview of Attitude - Types of Attitudes - Attitude Formation -. Advantages/Disadvantages of Positive,4ltregative Attitude - Ways to Develop Positive Attitude C'oncept of motivation: Definition and Nature of Motivation/Motive * Internal and external motives - Theories of Motivation - Importance of self- motivation- Factors leading to de- motivation. **Self - esteem** - Definition and Nature of self'-esteem - Do's and Don'ts to develop positive self esteem - Low self esteem - Personality having low self esteem - Positive and negative self esteem.

UNIT- III:

Other Aspects of Personality Development Body language - Problem-solving - Contlict Management and Negation skills - Decision-making Skills - Leadership and qualities of a successful leader - Character building - Team-work – Time management - Work ethics - Good manners and etiquette - Emotional Ability/intelligence - Dimensions of Emotional Intelligence - Building Emotional Intelligence.

UNIT- IV:

Neetisatakam-Hol istic Development of Personal ity Verses- 19.20,21"22 (wisdom) - Verses- 29.31,32 (pride and heroism) - Verses- 26.28.63.65 (virrue) Personality of Role Model - Shrimad Bhagwadgeeta Chapter2-Verses 17 - Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 - Chapterl8 -
Verses 37,38,

UNIT- V:

Yoga & Stress Management Meaning and definition of Yoga - Historical Perspective of Yoga - Principles of Astanga Yoga by Patanjali- Meaning and Definition of Stress - Types of Stress - Eustress and Distress -stress Vlanagement -- Pranayama- Pranayama: Anulom and Vilom Pranayama - Nadishudhi Pranayama - Kapalabhati- Pranayama - Bhramari Pranayama - Nadanusandhana Pranayama * Meditation techniques: Om Meditation - Cyclic meditation : Instant Relaxation technique (QRT). Quick Relaxation'l'echnique (QR'f). Deep Relaxation J'echnique (DRT) (Theory & Practical).

PRACTICAL COMPONENTS:

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

S. No	Pose	Possible Interpretations
	nding with your hands on hips	gressive, disgusted
	nding upright	nfidence
	ms crossed on your chest	fensive
	sting your hand on your cheek	inking
	uching or rubbing your nose	ubt, lying
	sting your head in your hands	redom, Tired
	pping your fingers	patience
	ing your nails	rvous, Insecure
	ying with your hair	ecure
	bbing your eyes	sbelief, doubt

- Conduct the following exercise to develop communication skills - Negotiation Skills and Empathy

Exercise: Card Pieces

In this activity. team members trade pieces of playing cards to put together complete cards.

Uses -'This exercise is useful for showing team members others perspectives. It builds communication and negotiation skills , and helps people to develop empathy.

People and Materials :

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

Time - 15 minutes. Instructions:

1. Cut each playing card into half diagonally, then in half diagonally again, so you have four triangular pieces for each card.
2. Mix all the pieces together and put equal numbers of cards into as many envelopes as you have teams.
3. Divide people up into teams of three or four. You need at least three teams. If you're short of people, teams of two will work just as well.
4. Give each team an envelope of playing card pieces.
5. Each team has three minutes to sort its pieces, determine which ones it needs to make complete cards, and develop a bargaining strategy.
6. After three minutes, allow the teams to start bartering for pieces. People can barter on their own or collectively with their team. Give the teams eight minutes to barter.
7. When the time is up, count each team's completed cards. Whichever team has themost cards wins the round.

Advice for the Teacher/Facilitator After the activity, ask your team members to think about the strategies they used. Discuss these questions:

1. Which negotiation strategies worked? Which didn't?
2. What could they have done better?
3. What other skills. such as **active listening** or **empathy ,** did they need to use?

Conduct following Time management activity - Ribbon of Life

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

- If the life span of an individual is say. 100 years. Consider that each cm represents one year, The response will be that few live that long. Assuming a life of 75 to 90 years ,cut 10 to 25 cm of the ribbon, accordingly.
- What is the average age of the participants sitting here, the response would be 25 to 30 depending on the group, in that case, cut another 25 cms of the ribbon and say that is gone you cannot do anything.
- What is left is 50 years? People will say. "Yes"" but the answer is NO.
- Every year we have 52 weeks, that is 52 Sundays. If we multiply that by 50 years. i1 comes to 7.14 years. Reduce the ribbon by another 7.14 cm.
- We also usually have Saturdays off, so reduce another 7. cms.
- Public/ National holidays are l0 multiple with 50 years. That comes to another 1.5 years. Reduce ribbon by another 1.5 cms.
- Your casual leave, sick leave, and annual holidays approx. 40 days a year, multiplied by 50.
- Your casual leave, sick leave, and annual holidays approx. 40 days a year, multiplied by 50. Cut off another 5 cms. Now you are left with about 29.5 years. But, the calculation is not over yet.
- You sleep an average of 8 hours daily; multiply that by 365 days and again by 50 years (i.e. 122 days X 50 : almost l7 years). Cut off another l7 cm.
- You spend time eating lunch, breakfast, snacks, and dinner tolal2 hours daily (i.e. 30 days a year X 50 years =4 years or so). Cut off another 4cm.
- Last, let's figure we spend about I 'hour a day traveling from place to place for activities and such. (that's about 2 more years). We're down to 6 (SIX) years of life to make it or break it.

Exercise Decision making skills - Create Your Own

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

APPENDIX-II

RUBRICS FOR ALLOCATING MARKS FOR LABORATORY EXAMINATIONS AND PROJECT WORK

- Scheme of Evaluation of Internal Laboratory Examination

Viva	Written Procedure	Execution	Total Marks
5 Marks	5 Marks	20 Marks	30 Marks

- Scheme of Evaluation of External Laboratory Examination

Record	Viva	Written Procedure	Execution	Total Marks
10 Marks	10 Marks	10 Marks	40 Marks	70 Marks

- Internal assessment of Project Work will be done by the concerned Project Internal Guide and HOD for 100 Marks.

Evaluation Schema for Continuous Internal Assessment of Project Work		
Review-I	Submission of Abstract	20 Marks
Review-II	Submission of Data Dictionary & UML/ER Diagrams	20 Marks
Review-III	Project Execution	30 Marks
Record Submission		30 Marks
Total		100 Marks

- External evaluation will be carried out by the External Examiner appointed by the Controller of Examinations for 100 Marks

Evaluation Schema for External Assessment of Project Work for	
Project Record	20 Marks
Execution	50 Marks
Viva Voce	30 Marks
Total	100 Marks

- External evaluation will be carried out by the External Examiner appointed by the Controller of Examinations for 200 Marks

Evaluation Schema for External Assessment of Project Work for	
Project Record	40 Marks
Execution	100 Marks
Viva Voce	60 Marks
Total	200 Marks

- Every faculty member must guide a minimum of five students in Project Work off the designated workload

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (Computer Science) Programme – III Semester

Course	Internet of Things		
Course Code	20CS3T1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective: To understand and gain knowledge on *Over View* of *Internet of Things*, *Models*, *Layers* & S*tandardization*, *Protocols* & *Design Principles* for Connected Devices, *Internet Connectivity Principles*, *Protocols* & *Application Layer Protocols*, *Data Acquiring*, *Business Models*and *Business Processes*.

Course Outcomes: On successful completion of the course student will be able to:

CO1: Attain knowledge over view of *Internet of Things*.

CO2: Understand *Models*, *Layers* & *Standardization*.

CO3: Apply *Protocols* & *Design Principles* for Connected Devices.

CO4: Understand *Internet Connectivity Principles*, *Protocols* & Application Layer Protocols.

CO5: Understand *Data Acquiring*, *Business Models* and *Business Processes*.

Syllabus

Unit	Learning Units	Lecture Hours
I	**The Internet of Things:** An Overview of Internet of Things, Internet of Things Technology, Behind IoT Sources of the IoT, M2M Communication, Examples of IoT, Design Principles for Connected Devices, Business Models for Business Processes in the Internet of Things.	12
II	**Design Principles for Connected Devices:** IoT / M2M systems layers and Designs Standardizations, Modified OSI Stack for the IoT / M2M Systems, ETSI M2M Domains and High-level Capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway ease of Designing and Affordability.	12
III	**Design Principles for the Web Connectivity:** Design Principles for the Web Connectivity for Connected Devices, Web Communication Protocols for Connected Devices, Message Communication Protocols for Connected Devices, Web Connectivity for Connected Devices.	12
IV	**Internet Connectivity Principles:** Introduction, Internet Connectivity, Application Layer Protocols: *HTTP, HTTPS, FTP, Telnet.*	12
V	**Data Acquiring, Organizing and Analytics in IoT / M2M**: Introduction, Applications / Services / Business Processes, IOT / M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.	12

Prescribed Text Book			
	Author	Title	Publisher
1	Rajkamal	Internet of Things: Architecture, Design Principles and Applications	McGraw Hill Higher Education

Reference Text Book			
	Author	Title	Publisher
1	Adrian McEwen and Hakim Cassimally	Designing the Internet of Things	Wiley
2	CunoPfister	Getting Started with the Internet of Things.	Oreilly

Course Focus: Employability

Websites of Interest:

1. https://dzone.com/iot-developer-tutorials-tools-news-reviews
2. https://www.ibm.com/blogs/internet-of-things/

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme –III Semester

CourseCode: **20CS3T1** Title: **Internet of Things (IoT)**

Time:3Hours Max.Marks:70

SECTION-A

1. AnswerALLquestions (10x2 = 20Marks)

1. a) What is *M2M Communication*. (BTL1)
b) What are *Connected Devices*? (BTL1)
c) Write about *Modified ISO*. (BTL1)
d) What is a *Gateway?* (BTL1)
e) What is *Communication Protocol*? (BTL1)
f) What is *Resource and Resource Repository?* (BTL1)
g) What is *Header? Explain TCP Header.* (BTL1)
h) What is *Protocol Data Unit and Maximum Transferable Unit.* (BTL1)
i) Write about *Event Data.*(BTL1)
j) What are *Active* and *Passive Devices?* (BTL1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. (5×10=50Marks)

UNIT – I

2) a) Explain an overview of IOT. (BTL2)
(or)
b) Explain M2M Communication. (BTL2)

UNIT – II

3) a) Explain various *Layers* & *Design Standardization Principles* of IOT. (BTL2)
(or)
b) Explain different *communication technologies* used in IOT. (BTL2)

UNIT – III

4) a) What are *Web Communication Protocols* for Connected Devices? (BTL1)
(or)
b) What are various *Design Principles* for the Web Connectivity? (BTL1)

UNIT – IV

5) a) Explain in detail *Internet Connectivity Principles*. (BTL5)
(or)
b) Explain any two *Application Layer Protocols.* (BTL5)

UNIT – V

6) a) Illustrate *Business Models* for *Business Processes* in the Internet of Things. (BTL2)
(or)
b) Explain *Integration* and *Enterprise* Systems. (BTL2)

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(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme - III Semester

Course	Cryptography & Network Security		
Course Code	20CS3T2	Course Delivery	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective: To understand and gain knowledge on *Computer & Network Security*, *Number Theory, Classical Encryption Techniques, Advanced Encryption Standard and Random Bit Generation and Stream Ciphers*, *Number Theory*, *Public Key Cryptography and RSA*, *Other Public-Key Crypto Systems and Message Authentication Codes*, *Digital Signatures*, *Key Management and Distribution* and *User Authentication*, *Transport Level Security, Electronic Mail Security and IP Security* and *Intruders and Firewalls*.

Course Outcomes: On successful completion of this course, the students will be able to:

CO1 *: Understand* Computer & Network Security Concepts, Classical Encryption Techniques and Advanced Encryption Standard.
CO2 : Gain knowledge on *Number Theory*, *Public Key Cryptography and RSA*, *Other Public-KeyCrypto Systems* and *Message Authentication Codes*.
CO3 *: Know* Digital Signatures, Key Management and Distribution *and* User Authentication.
CO4 : Understand *Transport Level Security*, *Electronic Mail Security* and *IP Security*.
CO5 : Gain knowledge about *Intruders and Firewalls.*

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Computer & Network Security Concepts:** Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques **Advanced Encryption Standard:** AES Structure, An AES Example, AES Implementation. Random Bit Generation and Stream Ciphers: Principles of Pseudo Random Number Generation, Pseudo Random Number Generators.	12

II	**Introduction to Number Theory:** Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. **Public Key Cryptography and RSA:** Principles of Public Key Crypto Systems, The RSA Algorithm. **Other Public-Key Crypto Systems:** Key Management, Diffie-Hellman Key Exchange,Elliptic Curve Arithmetic, Elliptic Curve Cryptography. **Message Authentication Codes:** Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC.	12
III	**Digital Signatures:** Digital Signatures, NIST Digital Signature Algorithm. **Key Management and Distribution:** Symmetric Key Distribution Using Asymmetric Encryption,Distribution of Public Keys. **User Authentication:** Kerberos, Remote User-Authentication Using Asymmetric Encryption.	12
IV	**Transport Level Security:** Transport Layer Security. **Electronic Mail Security:** S/MIME, Pretty Good Privacy. **IP Security:** IP Security Overview, IP Security Policy, Encapsulating Security Payload,Combining Security Associations.	12
V	**Intruders:** Intruders, Intrusion Detection, Password Management. **Firewalls:** The Need for Firewalls, Firewall Characteristics and Access Policy, Types of Firewalls.	12

Prescribed Text Book

	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Seventh Edition, 2017

Reference Text Book

	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Sixth Edition, 2014
2	William Stallings	Network Security Essentials-Applications and Standards	Pearson Education (2007), Third Edition.
3	Chris McNab	Network Security Assessment	OReilly (2007), 2nd Edition
4	Jon Erickson	Hacking-The Art of Exploitation	Press (2006),SPD
5	Neal Krawety	Introduction to Network Security	Thomson (2007).

Course has focus on : Employability

Websites of Interest :

1. https://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighere d/preface/0132775069.pdf
2. http://faculty.mu.edu.sa/public/uploads/1360993259.0858Cryptography%20and%20Network %20Security%2 0Principles%20and%20Practice,%205th %20Edition.pd

Co-curricular Activities : Programming Contests, Hackathons & Quiz.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme –III Semester

CourseCode: **20CS3T2** Title: **CRYPTOGRAPHY & NETWORK SECURITY**

Time:3Hours Max.Marks:70

SECTION-A

Answer ALL questions (10×2 = 20 Marks)

1) a) What is *Caesar Cipher*? (BTL1)
   b) Write any two characteristics of Randomness. (BTL1)
   c) What is the Purpose of the *Euclidean Algorithm*? (BTL1)
   d) What is Message Encryption? (BTL1)
   e) What is the difference between *Symmetric Key Distribution* & *Asymmetric KeyDistribution*? (BTL1)
   f) What is *Mutual Authentication?* (BTL1)
   g) State any two Protocols of *Transport Layer Security*. (BTL1)
   h) What is *Pretty Good Privacy?* (BTL1)
   i) What is *Firewall?* (BTL1)
   j) State any two *Intrusion Detection Techniques*. (BTL1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. (5×10 = 50 Marks)

UNIT- I

2) a) Explain various *Security Attacks* and *Security Services*. (BTL2) 10 Marks

(or)

b) Explain *AES Encryption* and *Decryption* Process. (BTL2) 10 Marks

UNIT- II

3) a) Illustrate *Diffie-Hellman Key Exchange*. (BTL2) 10 Marks

(or)

b) Explain *Internal and External Error Control* in Message Authentication Functions. (BTL2) 10Marks

UNIT-III

4) a) Explain *NIST Digital Signature Algorithm* with diagram. (BTL5) 10 Marks

(or)

b) Explain *Kerberos* in detail. (BTL5) 10 Marks

UNIT-IV

5) a) Explain *Confidentiality* and *Authentication* in S/MIME(BTL5) 10 Marks

(or)

b) Illustrate *Overview of IP Security*. (BTL5) 10 Marks

UNIT-V

6) a) Discuss what are the problems that may intruder create and explain how to overcome those problem? (BTL6) 10 Marks

(or)

b) Discuss *Various Types of Firewalls*. (BTL6) 10 Marks

UNIT – V

7) a) Illustrate *Business Models* for *Business Processes* in the Internet of Things. (BTL2)

(or)

b) Explain *Integration* and *Enterprise* Systems. (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (ComputerScience)Programme - III Semester

Course	**Design & Analysis of Algorithms**		
Course Code	20CS3T3	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective: The objective of this course is to develop proficiency in *Problem Solving and Programming*, To *Perform Analysis of various Algorithms in regard to Time and Space Complexity*, Gain *good understanding of Applications of Data Structures*, To develop a base for *Advanced Study* in *Computer Science*, To apply *Design Techniques* to solve different types of problems as per their *Complexity* and Develop *ability to segregate NP- Hard and NP-Complete problems.*

Course Outcomes: On successful completion of this course, the students will be able to:

CO1 : Understand *Basic Ideas* about *Analysis of Algorithms and the Concept of Data Structures.*

CO2 : Know *Divide and Conquer ,Greedy Methods* and *Solving Various Problems* by applying them. **CO3 :** Apply *Dynamic Programming Method* and *Basic Traversal and Search Techniques* to solve variousProblems.

CO4 : Understand *Backtracking* and *Branch and Bound* Techniques to Design Algorithms.

CO5 : Categorize *NP-Hard* and *NP-Complete* Problems.

Syllabus

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Algorithm, Algorithm Specification Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity Time Complexity, Asymptotic Notation, Performance Measurement, Randomized Algorithms: Basics of Probability Theory, Randomized Algorithms Identifying the Repeated Element, Primality Testing: Advantages and Disadvantages. **Elementary Data Structures:** Stacks and Queues, Trees: Terminology, Binary Trees, Dictionaries: Binary Search Trees, Priority Queues, Heaps , Heapsort , Sets and Disjoint Set Union: Introduction-Union and Find Operations, Graphs: Introduction, Definitions, graph representations.	10
II	**Divide-and-Conquer:** General Method, Defective Chess Board, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort, Selection Problem, Strassen's Matrix Multiplication, Convex Hull: Some Geometric Primitives, The Quick Hull Algorithm, Graham's Scan, An O(nlogn) Divide and Conquer Algorithm. **The Greedy Method:** The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.	14
III	**Dynamic Programming:** The General Method, Multi Stage Graphs, All Pairs Shortest Paths, Single Source Shortest Paths, Optimal Binary Search Trees, String Editing -0/1 Knapsack, Reliability Design, The Traveling Sales 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.	17
IV	**Backtracking:** The General Method, The 8-Queens Problem, Sum of Subsets, GraphColoring, Hamiltonian Cycles, Knapsack Problem. **Branch and Bound :** The Method: Least Cost Search, The 15 Puzzle Control Abstractionsfor 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, TravelingSales person.	11
V	**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 Scheduling, NP-Hard Code Generation Problems, Code Generation With Common Sub Expressions, Implementing Parallel Assignment Instructions, Some Simplified NP-Hard Problems.	8

Prescribed Text Book

S.No	Author	Title	Publisher
1	Sartaj Sahni	Fundamentals of Computer Algorithms	Second Edition, Universities Press(2008)

Reference Text Books			
S.No.	Author	Title	Publisher
1	Anany Levitin	Introduction to the Design & Analysis of	Second Edition, Pearso
2	I.Chandra Mohan	Design and Analysis of Algorithms	PHI
3	Prabhakar Gupta, Vineet Agrawal	Design and Analysis of Algorithms	PHI
4	Parag Himanshu, Dave	Design and Analysis of Algorithms	Pearson Education (2008)

Course Focus: Foundation **/ S**kill Development.

Reference Websites :

1. https://epgp.inflibnet.ac.in/Home
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of- algorithms-spring-2015/lecture-notes/
3. https://www.cukashmir.ac.in/cukashmir/User_Files/imagefile/DIT/StudyMaterial/DAA/DAA_UNIT- I_6th-Sem_StudyMaterial.pdf

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M.Sc., (ComputerScience)Programme –III Semester

CourseCode: **20CS3T3** Title: **DESIGN AND ANALYSIS OF ALGORITHMS**

Time:3Hours Max.Marks:70

SECTION-A

Answer ALL questions (10×2 = 20 Marks)

1. a) Define *Algorithm*. (BTL1)
b) What is a *priority queue*? (BTL1)
c) Define *Convex Hull.* (BTL1)
d) What is *tree vertex splitting?* (BTL1)
e) What is *String Editing ?* (BTL1)
f) Differentiate *DFS and BFS.* (BTL1)
g)What is *Graph colouring?* (BTL1)
h) What is *LC and FIFO Branch and Bound?*(BTL1)
i) Compare *NP hard and NP complete classes.* (BTL1)
j) What is *flow shop scheduling* in *NP Hard Scheduling problems?* (BTL1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. (5×10 = 50 Marks)

UNIT – I

2) A) Explain *Asymptotic Notations* regarding time and space complexities of an algorithm.(BTL2)

(or)

B) Explain in detail about *Heap Sort Technique* with an example.(BTL2)

UNIT – II

3) A) What is *Divide and Conquer approach? A*pply it on *Quick Sort* with an example. (BTL2)

(or)

B) What is *Greedy method*? Explain *Kruskal's Algorithm* to find *minimum cost spanning tree* with an example. (BTL2)

UNIT – III

4) A) Explain the application of Dynamic Programming on Travelling Salesman Problem.(BTL2)

(or)

B) Explain the procedure to obtain Optimal Binary Search Tree by applying Dynamic Programming approach. (BTL2)

UNIT – IV

5) A) What is 0/1-Knapsack Problem ? Solve it using Branch and Bound technique. (BTL2)

(or)

B) Explain the Sum of Subsets Problem. How can it be solved using Back Tracking Technique? (BTL2)

UNIT – V

6) A) Write *Cook's theorem*. Briefly explain *Cook's theorem*. (BTL2)

(or)

B) Discuss various *NP Hard Graph Problems*. (BTL2)

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (ComputerScience)Programme - III Semester

Course	**Data Mining Techniques**		
Course Code	20CS3T4	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours /	4	Semester End Exam	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective:

To understand and gain knowledge on *Basic Concepts*, *Applications*, Techniques of Data Mining, *Data Warehouse Architecture* and its *Components*, *Schemas*, *Different OLAP Operations*, *Characterize The Kinds of Patterns that can be discovered by Association Rule Mining*, *Data Classification and Prediction Techniques, Identify the Similarities among the data Using Clustering Algorithms* and *Outlier Analysis*.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Understand the *Basics of Data Mining* and *Data Pre-Processing Techniques*.

CO2: Aware of constructing the *Data Warehouse*, OLAP and relevant *Data Model Concepts*.

CO3: Understand the *Frequent Itemset Mining Methods* and Different Levels in Association Rules.

CO4: Understand the *Basic Concepts in Classification* and *Advanced Classification Methods* by implementing *Various Algorithms*.

CO5: Find the similarities among the data using *Clustering Algorithms* and *Outlier Analysis*.

Syllabus

Unit	Learning Units	Lecture Hours
I	**Introduction:** What is Data mining?, What Kind of Data can be Mined, What kinds of Patterns can be Mined, Major Issues in Data Mining**.** **Data Preprocessing:** Data Preprocessing : An Overview, Data Cleaning, Data Integration, Data Reduction-Overview of Data Reduction Strategies, Attribute Subset Selection, Regression and Log Linear Models, Histograms and Clustering, Data Transformation : Data Transformation Strategies Overview, Data Transformation by Normalisation, Discretization by Binning.	12
II	**Data Warehousing and OLAP:** Data Warehouse : Basic Concepts, What Is a Data Warehouse?, Difference between Operational Database Systems and Data Warehouses, Why have a separate Data Warehouse?, Data Warehousing : A Multiered Architecture, Data Warehouse Models, Extraction, Transformation and Loading, Metadata Repository, Data Warehouse Modeling : Data Cube and OLAP-A Multidimensional Data Mode-From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes and Fact Constellations : Schemas for Multidimensional Data Models , Dimensions : The Role of Concept Hierarchies, Measures: their categorisation and computation, Typical OLAP Operations in the Multidimensional Data Model, A Starnet Query Model for Querying Multidimensional Databases.	12
III	**Mining Frequent patterns, Associations:** Basic Concept, Market Basket Analysis : A Motivational Example, Frequent Item Sets, Closed Item Sets and Association Rules, Frequent Item Set Mining Methods. **Advanced Pattern Mining:** Pattern Mining : A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Mining Multilevel Association Rules, Mining Multi Dimensional Associations, Mining Quantitative Association Rules.	12
IV	**Classification: Basic Concepts:** What is Classification?, General Approaches to Classification, Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Bayes Classification Methods, Bayes Theorem, Navie Bayesian Classification. **Classification: Advanced Methods:** Bayesian Belief Networks, Concepts and Mechanisms, Training Bayesian Belief Networks, Classification by Back Propagation.	12
V	**Cluster Analysis Introduction:** What is Cluster Analysis?, Requirements for Cluster Analysis, A Partitioning Methods : K-Means, K-Medoid, Hierarchical Methods :Agglomerative versus Divisive Hierarchical Clustering, Distance Measures inAlgorithmic Methods, BRICH : Multiphase Hierarchical Clustering using Clustering Feature Trees, Chameleon Hierarchical Clustering, Density Based Methods : DBSCAN. **Outlier Detection:** What is Outliers Analysis?, Types of Outliers, Challenges of Outlier Detection.	12

Text Books			
	Author	Title	Publisher
1	Jiawei Han, Micheline Kamber	Data mining : Concepts& Techniques	Morgan Kaufmann 3rd Edition Chapter-1 1.2,1.3,1.4,1.7 Chapter-3 3.1,3.2,3.3,3.4(3.4.1,3.4.4,3.4.5,3.4.6,3.4.7) Chapter-4 4.1 to 4.2 Chapter-6 6.1 to 6.2 Chapter-7 7.1,7.2(7.2.1 to7.2.3) Chapter-8 8.1,8.2(8.2.1,8.2.2,8.2.3,8.2.4),8.3 Chapter-9 9.1 to 9.2Chapter-10 10.1,10.2,10.3(10.3.1,10.3.2,10.3.3,10.3.4),10.4(10.4.1) Chapter-12 12.1(12.1.1,12.1.2,12.1.3)

Reference Books			
	Author	Title	Publisher
1	Ralph Kimball	The Data Warehousing Toolkit	Wiley
2	S.N.Sivanandam, S.Sumathi	Data Mining-Concepts, Tasks and Techniques	Thomson

Websites of Interest:

1. www- db.standford.edu /`ullman/mining/mining.html : Data mining lecture notes.
2. ocw.mit.edu/ocwweb/slon-School-of-management/15-062Data-Mining Spring2003/course

Course Focus: Foundation **/ E**mployability / **S**kill Development.

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (ComputerScience)Programme –III Semester

CourseCode: **20CS3T4** Title: **DATA MINING TECHNIQUES**

Time:3Hours Max.Marks:70

Answer ALL questions ***(10×2 = 20 Marks)***

1. a) Difference between *Data Mining* and *KDD* (BTL4)
   b) What is meant by *Data Preprocessing*? (BTL1)
   c) Define *Multidimensional Data model.* (BTL1)
   d) OLAP versus OLTP (BTL4)
   e) Give one example for *Closed Itemset* and *Maximal Frequent Itemset* (BTL1)
   f) What is meant by *Association Rule*? (BTL1)
   g) Explain *Bayes Theorem.* (BTL2)
   h) Define *Classification* with Example. (BTL1)
   i) What are the requirements of *Cluster Analysis*? (BTL1)
   j) What is meant by *Outliers*? (BTL1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. (5×10 = 50 Marks)

UNIT – I

2) A) Define Data Mining. What kinds of Patterns can be mined in *Data Mining*. 10M (BTL1)

(or)

B) Define *Data Integration*. What are the *Different Techniques used in Data Integration*. 10M (BTL1)

UNIT – II

3) A) Define *Data Warehouse*. Explain *Data Warehouse Architecture* with neat Diagram. 10M (BTL1)

(or)

B) What are the different types of *Schemas* used in *Multi Dimensional Data Model*? 10M (BTL1)

UNIT – III

4) A) Explain *Aprior Algorithm* with Example. 10M (BTL2)

(or)

B) Explain *Multi Level and Multi Dimensional Association Rules* with Examples. 10M (BTL2)

UNIT – IV

5) A) Explain *Decision Tree Induction Algorithm* with Example. 10M (BTL5)

(or)

B) Explain *Naïve Bayes Classification* with Example. 10M (BTL5)

UNIT – V

6) A) Explain *Different Partitioning Methods* used in *Cluster Analysis*. 10M (BTL2)

(or)

B) Explain in detail about *Hierarchical Clustering*.10M (BTL2)

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M.Sc., (ComputerScience)Programme - III Semester

Course	**Web Technologies Lab**		
Course Code	20CS3L1	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective: Able to build functional *Web Applications using HTML*, Able to use *JavaScript and DHTML* for *Web Designing*, Able to code using XML and PHP for *Integrating with Web Pages*, *Create Dynamic Web Pages* where in client interaction is facilitated using advanced server technology like *JSP* and *Web Pages* with *Database Connectivity using PHP*.

Course Outcomes: On successful completion of the course student will be able to:

CO1: Build functional *Web Applications HTML*.

CO2: Incorporates *Multimedia Capabilities* and *Web Page Designs* using *Cascading Style Sheets*.

CO3: Code *Client Server Interaction Programs* using *Java Based Server Technology* named *Servlets*.

CO4: Create *Dynamic Web Pages* where in *Client Interaction* is facilitated using Advanced Server Technology like *JSP*.

CO5: Integrate *Offline Data Storage*, *Background Processes* and APIs using *Database Connectivity* and *ASP*.

Web technology Lab Syllabus

Course Details

HTML:

1. Develop HTML code to provide intra document linking. (BTL6)
2. Develop HTML code to provide inter document linking. (BTL6)
3. Develop a program to implement the three types of lists. (BTL6)
4. Create a HTML page using frames. (BTL6)
5. Develop a program to embed college picture into your web page and develop a short note on your collegeusing paragraph tag. (BTL6)
6. Illustrate a suitable example; depict how we can align text using a table tag as follows. (BTL2)

II M.C.A	Pass percenetage=95%
	Fail percentage=5%
III M.C.A	Pass percenetage=97%
	Fail percentage=3%

7. Develop a program to create the time table as follows: (BTL6)

	1	2	3		4	5	6
MON	<------WEB LAB------>				SE	WEB	PPL
TUE	UML	CRY	SE	B	<-------VB LAB------->		
WED	WEB	SE	UML	R	CRY	PPL	
THU	CRY	WEB	PPL	E	<------WEB LAB------>		
FRI	<-------VB LAB------->			A	PPL	WEB	UML
SAT	SE	CRY	UML	K	<------SEMINARS------>		

8. Create a Registration form that interacts with the user. Collect login name, password, date of birth,sex, address, qualification and display a “Thank you for registering” message when the user submits the form. (BTL6)

Login name:
Enter Password:
Reenter Password:
Birthdate:
Sex: Female Male
Enter Address
Enter qualification
Login Login clear clear

Java Script:

9. Develop a script to compare two strings using String object. (BTL6)
10. Develop a script to generate random numbers within 1 to 10 and display the numbers in a table. (BTL6)
11. Develop a Java Script to update the information into the array, in the "onClick" event of the button"Update". (BTL6)
12. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill withthe total being added up simultaneously. (BTL6)

Item details	Price of item	Click here to select
	8399	☐
	5000	☑
	450	☑
	399	☐
YOUR TOTAL BILL IS 5450		

13. Develop a script to find the duplicate elements of an array. (BTL6)
14. Develop a script which generates a different greeting each time the script is executed. (BTL6)
15. Develop a JavaScript to check the number is Armstrong number or not by getting the number from textboxand the result is displayed in a alert dialog box. (BTL6)
16. Develop a java script code that accepts user name and password from user, Check their correctness anddisplay appropriate alert messages. (BTL6)

DHTML:

17. Create an inline style sheet. Illustrate the use of an embedded style sheet. (BTL6)
18. Create an external style sheet to illustrate the "Font" elements. (BTL6)
19. Develop a program to switch on and off light using onClick event. (BTL6)
20. Illustrate different types of filters (at least six) on a sample text. (BTL2)
21. Develop a program to illustrate tabular data control for data binding. (BTL6)

XML:

22. Create a small XML file designed to contain information about student performance on a module. Eachstudent has a name, a roll number, a subject mark and an exam mark. (BTL6)
23. Create a internal DTD file. (BTL6)
24. Create an external DTD file. (BTL6)
25. Create a XSLT style sheet to display the student data as an HTML table. (BTL6)

PHP:

26. Illustrate PHP declarations and expressions to find factorial of a given number using. (BTL2)
27. Develop a PHP program that interacts with the user .Collect first name last name and date of birth anddisplays that information back to the user. (BTL6)
28. Develop a PHP program to connect MySQL Database.

JSP:

29. Develop a program to implement JSP directives. (BTL6)
30. Develop a JSP program for session tracking. (BTL6)

Prescribed Textbook			
	Author	Title	Publisher
1	N.P.Gopalan, J.Akilandeswari	Web Technologies-A Developer's Perspective	PHI(2008)
2	Harvey M. Deitel and Paul 1. Deitel	Internet and World Wide Web How To Program, 5e	Prentice Hall; 4th edition

Course Focus: Employability

Websites of Interest:

1. https://www.w3schools.com
2. https://www.edx.org/learn/web-development
3. https://www.codecademy.com/learn/paths/web-development

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru – 521165.
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M.Sc., (ComputerScience)Programme – III Semester

Course	**Data Mining Lab**		
Course Code	20CS3L2	Course Delivery Method	Class Room / Blended
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2020-21	Year of Offering:2021-22	Year of Revision:2021-22	Percentage of Revision: 0%

Course Objective:

The main objective of this lab is to impart the knowledge on *How to implement Data Mining Algorithms using Various Tools* and *How to characterize the kinds of Patterns* that can be discovered by *Association Rule Mining*, *Classification*, *Clustering*, *Identifying Outliers* and Emphasize *Hands-onExperience* working with all *Real Time Data Sets*.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Understand the *Various Kinds of Tools*.

CO2: Apply *Mining Techniques* for *Realistic Data*.

CO3: Understand the *Basic Concepts* in R and *Weka*.

CO4: Understand how to import and export *CSV Files* and *Package* installation in R.

CO5: Develop and visualization of *Data Mining Algorithms* in R.

Using Weka Tool:

1. How to create and load *Data Set* in Weka. (BTL1)
2. Interpret all the *Categorical (or Nominal) Attributes* and the *Real-Valued Attributes* separately. (BTL2)
3. Construct *Association Rules* using Weka.(BTL6)
4. Construct *Multilayer Perceptron* or *Neural Network.* (BTL6)
5. Construct *Time Series Forecasting* using Weka. (BTL6)
6. Demonstration of preprocessing to remove *Attributes*, *Instances* and *Perform Discretization* using datasetweather.arff. (BTL2)
7. Create *K-Mean Clustering* using *Weka*.((BTL6)
8. Develop *Decision Tree* by training data set using *Weka*. (BTL6)
9. Create Hierarchical *Clustering* using *Weka*. (BTL6)
10. Identifying and removing *Outliers* using Weka. (BTL1)

Using R Programming:

1. How to import data into R from text and excel files using *read.table()* and *read.csv* functions. (BTL1).
2. Create *Association Rules* using *Aprior Algorithm* in R. (BTL6)
3. Construct *Multilayer Perceptron* or *Neural Network* using R. (BTL6)
4. Apply *Time Series Analysis* using R. (BTL3)
5. Apply *Time Series Forecasting* using R. (BTL3)
6. Apply *Time Series Decomposition* using R. (BTL3)
7. Create *K-Means Clustering Algorithm* using R. (BTL6)
8. Construct *Decision Tree* in R using package party. (BTL6)
9. Create *Hierarchical Clustering* using R. (BTL6)
10. Crate Hierarchical Clustering with Euclidean Distance using R(BTL6)
11. Examine *K-Medoids* clustering using R. (BTL4)
12. *Detecting* and *Removing* outliers using R. (BTL1)
13. Construct *Density Based Clustering* using R. (BTL6)
14. Illustrate *Linear Regression* using R. (BTL2)
15. Illustrate *Multiple Regression* using R. (BTL2)
16. Illustrate Logistic Regression using R. (BTL2)
17. Construct *Outlier Detection by Clustering* using R. (BTL6)
18. Detecting and Removing Missing values in R. (BTL1)
19. Create different kinds of *Charts* using *Sample Data Sets* in R. (BTL6)
20. Create *Word Cloud* using R. (BTL6)

Websites of Interest :

1. https://www.cs.waikato.ac.nz/ml/weka.
2. https://weka.wikispaces.com
3. https://www.rdocumentation.org/packages/stats/versions/3.6.2
4. http://www.r-bloggers.com/

Course Focus: Foundation **/ E**mployability / **S**kill Development.