Adusumilli Gopalakrishnaiah & Sugarcane Growers
Siddhartha Degree College of Arts & Science
(Autonomous)

Vuyyuru-521165, Krishna District, Andhra Pradesh

Department of PG Computer Science

Minutes of the Meeting of the Board of Studies in P.G. Computer Science (M.Sc.)

Date: 21-09-2024

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

DEPARTMENT OF PG COMPUTER SCIENCE

List of Board of Studies Members

S. No	Name of the Staff member, Designation & College	Role	Signature
1	**T. Naga Prasada Rao**, Head, Department of Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Chairman	
2	**Dr. M. Babu Reddy**, Principal, Krishna University College of Engineering and Technology, Machilipatnam, Mobile No. 9963436460, Email id: m_babureddy@yahoo.com	University Nomine	
3	**Dr. G. Krishna Mohan,** Prof, Dept. Of CSE(Artificial Intelligence and Machine Learning), Vishnu Institute of Technology, Bhimavaram, Ph: 8297313195, Email : krishnaugcnet@gmail.com	Subject Expert	
4	**Dr. Yugandhar Garapati**, Assistant Professor, Department of Computer Science & Engineering, GITAM deemed to be University, Hyderabad, Mobile Number 9866688563, Email id: yugandhar.garapati@gmail.com	Subject Expert	
5	**Mr. U. Sairam,** CEO, Codegnan IT solutions, OPC Pvt. Ltd. Vijayawada-520002, mobile no. 9959555952, email id: uppugundlasairam@gmail.com	Industrial Expert	
6	**Mr. S. Naveen,** Senior Engineer, HCL Tech, Vijayawada, Email Id: naveen.sandaka@hcl.com, Mobile No. 9603064138	Alumnus	
7	**Ch. Anil Kumar**, Assistant Professor in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
8	**G. Katyayini**, Assistant Professor in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
9	**Sharmila Begum**, Assistant Professor in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	

Minutes of the meeting of Board of Studies in P.G. Computer Science for I year I Semester, II year III Semester of M.Sc. (Computer Science) of Adusumilli Gopalakrishnaiah & Sugarcane Growers Siddhartha Degree College of Arts & Science, Vuyyuru, Krishna District held on 21-09-2024 at 3.30 PM in the Department of PG Computer Science through offline / online mode.

AGENDA

1. To discuss and approve the Programme Structure and Syllabi of Third Semester of M.Sc.(Computer Science) for the batch of students admitted from the Academic Year 2023-24 (R22) and onwards.
2. To discuss and approve the Programme Structure and Syllabi of First Semester of M.Sc.(Computer Science) for the batch of students admitted from the Academic Year 2024-25 (R22) and onwards.

PROPOSALS

As per the new regulations recommended by the Krishna University with effect from 2022-23(R22), new structure is formulated for M.Sc. (Computer Science) Programme. The Program Structure and Syllabi of First & Third Semesters may be approved for the batch of students admitted in the academic year 2023-24 & 2024-25.

1) It is resolved and recommended to continue the same syllabus without having any changes for III Semester of M.Sc. (Computer Science) programme for the Academic year 2024-25 for the following courses:

III Semester:

Course Code	Title of the Course
22CS1T1	Programming and Problem Solving Using Python
22CS1T2	Database Management Systems
22CS1T3	Formal Languages and Automata Theory
22CS1T4	Operating Systems
22PG101	Personality Development through Life Enlightenment Skills
22CS1L1	Programming and Problem solving using Python Lab
22CS1L2	Database Management Systems Lab

2) It is resolved and recommended to continue the same syllabus without having any changes for I Semester of M.Sc. (Computer Science) programme for the Academic year 2024-25 for the following courses:

I Semester:

Course Code	Title of the Course
22CS3T1	Data Science
22CS3E1	Design & Analysis of Algorithms
22CS3E2	Cryptography & Network Security
22CS3E3	Machine Learning
22CS3L1	Data Science Lab
22CS3L2	Machine Leaning Lab

3) Suggestions

… Chairman

Program Outcomes (POs):

PO1 **Technical Expertise and Knowledge in Multiple Domains**: Ability to develop an understanding of modern computing concepts and architectures from a design and performance perspective of various domains.

PO2 **Assessment from System Level Perspective**: Able to analyse and appreciate the structure of computer systems and the processes involved in their construction at various levels of detail and abstraction

PO3 **Critical Thinking, Business Analytics & Problem Solving and Innovation**: An ability to apply knowledge of mathematics and computer science practices to build Innovative Public & Private Sector Applications involving complex computing problem solving and in research

PO4 **Professional Ethics & Social Responsibility**: Ability to apply and commit to professional ethics following cyber regulations in a global economic environment. Create and design innovative applications to solve complex problems using established practices for the betterment of the society.

PO5 **Apposite to Industry**: Gain exposure to multiple programming languages, tools, paradigms, and technologies as well as the fundamental underlying principles throughout their education there by making them the right choice for industry positions.

PO6 **Effective Communication & Leadership**: Ability to communicate effectively and present technical & project management information using audio visual tools as well as in oral and written reports. Rise up to the need and be able to lead teams of individuals.

PO7 **Life-long Learning and Research**: Understand the importance of, and possess pre-requisite skill set to undertake life-long independent learning and research in the context of contemporary technological advancements.

Program Specific Outcomes (PSOs):

PSO1 To make the students industry ready as far as possible to enhance their employability in the industries.

PSO2 Create an ambience of education through faculty training, self-learning, sound academic practices and research endeavours.

PSO3 Design and develop innovative solutions using advanced computer science principles.

PSO4 Conduct research and analyse data to advance knowledge in a specific area of computer science.

PSO5 Effectively communicate complex technical concepts to both technical and non-technical audiences.

PSO6 Adapt to the evolving field of computer science and demonstrate strong lifelong learning skills.

Program Educational Objectives (PEOs):

PEO1 **Become successful computer science professionals**: Graduates will be able to secure employment in the IT industry or pursue research careers.

PEO2 **Think critically and solve complex problems**: Graduates will be equipped to analyze real-world problems and design effective computational solutions.

PEO3 **Foster ethical and professional conduct**: Graduates will demonstrate ethical responsibility in their professional practices.

PEO4 **Pursue lifelong learning and contribute to society:** Graduates will be instilled with a passion for lifelong learning and continuous professional development.

Course Structure

Class : M.Sc. (Computer Science)
Semester : III

Course Code	Course Title	Teaching Hours		Core / IDC / DSE / SEC / OEC / MOOCS	CIA	SEE	No. of Credits
		Lecture	Practical				
22CS3T1	Data Science	4	0	Core	30	70	4
Domain Specific Elective courses (Choose any THREE)							
22CS3E1	Design & Analysis of Algorithms	4	0	DSE	30	70	4
22CS3E2	Cryptography & Network Security	4	0	DSE	30	70	4
22CS3E3	Machine Learning	4	0	DSE	30	70	4
22CS3E4	Applied Data Analytics	4	0	DSE	30	70	4
22CS3E5	Internet of Things	4	0	DSE	30	70	4
22CS3E6	Block Chain Technologies	4	0	DSE	30	70	4
PRACTICALS							
22CS3L1	Data Science Lab	0	6	Core	30	70	3
22CS3L2	Machine Leaning Lab	0	6	Core	30	70	3
OPEN ELECTIVE (INTERDISCIPLINARY/MULTIDISCIPLINARY) COURSES (CHOOSE ANY ONE)							
22OE301	R-Programming	3	0	OEC	30	70	3
22OE302	Mobile Networks	3	0	OEC	30	70	3
22OE303	UNIX Programming	3	0	OEC	30	70	3
22OE304	Office Tools	3	0	OEC	30	70	3
22OE305	Python Programming	3	0	OEC	30	70	3
TOTAL					**210**	**490**	**25**

Course Structure

Class : M.Sc. (Computer Science)
Semester : I

Course Code	Course Title	Teaching Hours		Core / IDC / DSE / SEC / OEC / MOOCS	CIA	SEE	No. of Credits
		Lecture	Practical				
22CS1T1	Programming and Problem Solving Using Python	4	0	Core	30	70	4
22CS1T2	Database Management Systems	4	0	Core	30	70	4
22CS1T3	Formal Languages and Automata Theory	4	0	Core	30	70	4
22CS1T4	Operating Systems	4	0	Core	30	70	4
22PG101	Personality Development through Life Enlightenment Skills	3	1	Core	30	70	3
PRACTICALS							
22CS1L1	Programming and Problem solving using Python Lab	0	6	Core	30	70	3
22CS1L2	Database Management Systems Lab	0	6	Core	30	70	3
TOTAL					**210**	**490**	**25**

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3T1 – DATA SCIENCE

CourseName	DATA SCIENCE	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS3T1	4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil		**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks								

Course Description and Purpose:

The course is intended to cover, Introduction to Tableau, Basic Visualization Design, Connecting to Data, Top 10 Chart Types (Uni-variate/Bi-Variate & Multi-variate Charts), Interacting with the Viewer, Tableau Maps, Creating Dashboards and Stories, Introduction to Power Bi, Power Pivot Model and Power BI Environment.

Course Objectives:

The course aims to equip participants with comprehensive skills in Tableau and Power BI, covering fundamental concepts, visualization design, data connection, diverse chart types, viewer interaction, mapping, dashboard and story creation, as well as Power Pivot modelling, empowering them to proficiently analyse and visualize data for insightful decision-making.

Specific Objectives include:

- To understand Basics of Tableau, Visual Design and connecting various Data Sources.
- To know Uni-variate Charts, Bi-variate Charts, Multi-variate Charts, Interacting with the Viewer.
- To create Tableau Maps and Creating Dashboards and Stories.
- To implement Data Operations of Power BI.
- To implement Power Pivot Model and Power BI Environment.

Course Outcomes:

On successful completion the students should be able to

CO1 Upon completing this Tableau course, participants will master the fundamentals of Tableau, including workbook management, basic visualization design, and advanced data connection techniques, enabling them to create visually compelling and interactive data visualizations, analyse complex datasets, and make data-driven decisions effectively.

CO2 Upon completing this course, participants will gain expertise in a wide range of chart types for uni-variate, bi-variate, and multivariate data analysis, enabling them to effectively visualize and interpret complex datasets; additionally, they will acquire advanced skills in viewer interaction through various filtering techniques and actions, empowering them to create dynamic and insightful Tableau visualizations.

CO3 Upon completing this course, participants will master Tableau's mapping capabilities, including geocoding, custom geocoding, and advanced mapping techniques, allowing them to create visually appealing and insightful maps; furthermore, they will gain proficiency in crafting interactive and visually cohesive dashboards and stories, integrating various elements and actions for effective data communication and analysis.

CO4 Upon completion of this Power BI course, participants will acquire comprehensive knowledge and practical skills in utilizing Power BI, including data acquisition from diverse sources, implementing natural language queries, advanced data manipulation using functions, merging and transforming queries effectively, enabling them to create insightful data visualizations and analytics for informed decision-making and enhanced business intelligence.

CO5 Upon completing this course, participants will master Power Pivot and Power BI, enabling them to create robust data models, establishes relationships, implement advanced querying and merging techniques, design compelling visualizations, and effectively utilize calculations and measures, empowering them to analyse complex data sets, create interactive dashboards, and perform in-depth data modelling for diverse applications, including detailed analysis of Corona Cases.

Syllabus:

Unit	Learning Units	Lecture Hours
I	**Introduction to Tableau:** What is Tableau? - Opening Existing Workbooks - Creating New Workbooks. **Basic Visualization Design:** Using Show Me - Choosing Mark Types - Color - Size - Shape and Label Options- Choosing Color Options - Setting Mark Size - Choosing Shapes - Text Tables and Mark Labels - Formatting Options - Evaluating Multiple Measures - Shared Axis Charts - Measure Names and Measure Values - Dual Axis Charts. **Connecting to Data:** Connecting to Various Data Sources - The Data Source Page - Customizing Your View of the Data: Changing Data Type - Modifying Dimension / Measure Assignment - Hiding -Renaming and Combining Fields - Splitting Fields - Changing the Default Field Appearance - Organizing Dimensions in Hierarchies Using Table or Folder View - Saving and Sharing Metadata Extracting Data -Data Blending - Moving from Test to Production Database.	12
II	**Top 10 Chart Types (Uni-variate/Bi-Variate & Multi-variate Charts):** Bar Chart - Line/Area Chart - Pie Chart - Text Table / Crosstab - Scatter Plot - Bubble Chart - Bullet Graph - Box Plot - Tree Map - Word Cloud. **Interacting with the Viewer:** Filtering Data - Include or Exclude from the Worksheet - Basic Filtering -Quick Filters - Parameters - Creating a Parameter - Displaying a Parameter - Using a Parameter in a Worksheet - Worksheet Actions - Filter Actions - Highlight Actions - URL Actions.	12

III	**Tableau Maps:** Geocoded Fields - Geographic Hierarchies and Ambiguity - Custom Geocoding - Background Maps and Layers - Navigating Maps and Selecting Marks - Map Options - Web Map Services - Mapping and Mark Types - Custom Background Images - Generating Your Own Coordinate System - Adding a Custom Background Image. **Creating Dashboards and Stories:** Creating a Simple Dashboard - Setting Dashboard - Size - Adding Sheets - Associated Worksheet Elements - Supplementary Dashboard Features - Layout Container - Blank Text - Image - Webpage - Setting Dashboard and Element - Sizes - Dashboard Actions - Highlight Action - Filter Action - URL Action.	12
IV	**Power Bi:** Get Knowing Power Bi - Getting Data from Existing Systems - Data Sources of Power Bi - Natural Language Queries - Getting data from web - Importing Data from Northwind ODATA feed T3_IMF - Functions & list Dates in Power Bi - Group By and unpivot in Power Bi - Merging Queries in Power Bi - IPL Statistics in Power Bi	12
V	**Power Pivot Model:** Creating Data Model - Explain what a Data Model is, Create Relationships between Tables in the Model, Create and use a Star Schema - Merging Queries in Power Bi - Data Compute in Power Bi - Append Query in Power Bi - Charts in Power Bi - Data Modeling in Power Bi - Charts in Power Bi - Data Modeling in Power Bi. **Power BI: Power BI Environment:** Adding Calculations and Measures - Importing Graphs - User Graphs, Dash boards - Dashboard for Corona Cases analysis.	12

Prescribed Text Books

	Author	Title	Publisher
1	George Peck	Tableau 9 - The Official Guide	McGraw Hill, 2016
2	Dan Clark	Beginning Power BI: A Practical Guide to Self Service Data Analytics with Excel 2016 and Power BI Desktop	O'Reilley, Second Edition

Reference Text Books

	Author	Title	Publisher
1	Ashutosh Nandeshwar	Tableau Data Visualization Cookbook	Packt Publishing Ltd, 2013
2	Rob Collie & Avi Singh	Power Pivot and Power BI : The Excel User's Guide to DAX Power Query, Power BI & Power Pivot in Excel 2010-2016	Holy Macro! Books, 2016
3	Daniel G. Murray	Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software Second Edition	John Wiley & Sons

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computer Science), Third Semester(w.e.f. admitted batch 2022-23)

Course Name: DATA SCIENCE **Course Code:** 22CS3T1

Time: 3Hours **MaxMarks:70**

SECTION-A

Answer ALL Questions **(5×4=20Marks)**

1. (a) What is Tableau? Explain its role in Industry (CO1,L1)

(or)

(b) How do you change Data Type in Tableau. (CO1, L1)

2. (a) What is Tree Map? (CO2, L1)

(or)

(b) What is Quick Filter? (CO2, L1)

3. (a) Name any two Web Map Services. (CO3, L1)

(or)

(b) Name any two features of Supplementary Dashboard. (CO3, L1)

4. (a) Explain Natural Language Processing. (CO4, L2)

(or)

(b) Explain Functions used in Power Bi. (CO4, L2)

5. (a) What is Star Schema? Explain (CO5, L1)

(or)

(b) What are the advantages of Dashboard? (CO5, L1)

SECTION-B

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

6. (a) Explain Shape and Label Options and Formatting Options in Tableau. (CO1, L2)

(or)

(b) Illustrate how data sources connected to Tableau. (CO1, L2)

7. (a) Build Uni-variate Charts. (CO2, L3)

(or)

(b) Experiment with Basic Filters and Quick Filters. (CO2, L3)

8. (a) Compare any two types of Tableau Maps. (CO3, L4)

(or)

(b) Examine the procedure to create Simple Dashboard. (CO3, L4)

9. (a) Explain how import data from various existing data sources. (CO4, L5)

(or)

(b) Explain how to merge queries and operations on IPL dataset. (CO4, L5)

10. (a) Create Relationships between Tables in the Model (CO5, L6)

(or)

(b) Discuss how to import Graphs in Power BI. (CO5, L6)

(c) Discuss creating Measures in Power BI. (CO5, L6)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E1 – DESIGN ANALYSIS OF ALGORITHMS

CourseName	Design Analysis of Algorithms	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS3E1	4	0	0	4	30	70	100

Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil

L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks

CourseDescriptionandPurpose:
The course is intended to develop proficiency in Problem Solving and Programming, perform Analysis of various Algorithms in regard to Time and Space Complexity, gain of good understanding of Applications of Data Structures, develop base for Advanced Study in Computer Science, 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 Objectives:
This course will help the students to understand and learn basic ideas about Analysis of Algorithms, Divide-and-Conquer and Greedy Method, Dynamic Programing& Basic Traversal and Search Techniques, Backtracking and Branch and Bound Techniques and NP-Hard and NP-Complete Problems.

SpecificObjectivesinclude:
- To understand Basic Ideas about Analysis of Algorithms and the Concept of Data Structures.
- To know Divide and Conquer, Greedy Methods and Solving Various Problems by applying them.
- To apply Dynamic Programming Method and Basic Traversal and Search Techniques to solve various Problems.
- To understand Backtracking and Branch and Bound Techniques to Design Algorithms.
- To categorize NP-Hard and NP-Complete Problems.

Course Outcomes:
On successful completion the students should be able to

CO1 The course imparts a foundational understanding of algorithms, data structures, performance analysis, randomized algorithms, and graph theory, enabling students to analyse, design, and implement efficient solutions to a wide array of computational problems.

CO2 Students will have a comprehensive understanding of advanced algorithmic paradigms, including Divide-and-Conquer and Greedy methods, enabling them to apply these techniques to solve a wide range of computational problems efficiently and effectively.

CO3 The course empowers students with a comprehensive understanding of dynamic programming techniques, traversal and search algorithms for binary trees and graphs, equipping them with the skills to solve complex optimization problems efficiently and effectively in diverse domains.

CO4 The course provides students with a comprehensive understanding of backtracking and branch-and-bound algorithms, enabling them to efficiently solve complex combinatorial and optimization problems, such as the 8-Queens problem, graph colouring, and the traveling salesman problem, across various application domains.

CO5 The course equips students with a profound understanding of NP-Hard and NP-Complete problems, enabling them to recognize, analyse, and address computationally challenging problems across various domains, including graph theory, scheduling, code generation, and decision problem solving, while comprehending the theoretical underpinnings and implications of these complexities.

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.	12
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.	12
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.	12

IV	**Backtracking:** The General Method, The 8-Queens Problem, Sum of Subsets, Graph Colouring, 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.	12
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.	12

Prescribed Text Book:

1. Sartaj Sahni, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2nd Edition, 2008.

Reference Text Books:

1. Anany Levitin, Introduction to the Design & Analysis of Algorithms, 2nd Edition, Pearson Education, 2007.
2. I.Chandra Mohan, Design and Analysis of Algorithms, PHI, 2nd Edition, 2012.
3. Prabhakar Gupta, Vineet Agrawal, Design and Analysis of Algorithms, PHI, 2nd Edition 2012.
4. Parag Himanshu, Dave, Design and Analysis of Algorithms, Pearson Education, 1st Edition 2008.

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), ThirdSemester (w.e.f. admitted batch 2022-23)

Course Name: DESIGN & ANALYSISOF ALGORITHMS **Course Code:** 22CS3E1

Time: 3Hours **MaxMarks:70**

SECTION-A

Answer ALL Questions **(5×4=20Marks)**

1. (a) Define Algorithm. Explain the algorithm specificationbriefly. (CO1,L1)

(Or)

(b) What are the operations in a Priority Queue? (CO1, L1)

2. (a) Explain the Divide and Conquer Algorithms to solve Convex Hull Problem. (CO2, L1)

(Or)

(b) What is Tree Vertex Splitting? (CO2, L1)

3. (a) What is String Editing? (CO3, L1)

(Or)

(b) Differentiate DFS and BFS. (CO3, L1)

4. (a) What is Graph Colouring? (CO4, L1)

(Or)

(b) What is Branch and Bound technique? (CO4, L1)

5. (a) Compare NP hard and NP Complete Classes. (CO5, L1)

(Or)

(b) Explain flow shop scheduling in NP Hard Scheduling Problems. (CO5, L1)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

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

6. (a) Define Algorithm. Discuss Performance Analysis of Algorithms briefly. (CO1, L2)

(Or)

(b) Explain Disjoint Sets, Disjoint Set Union & Find Operations with Algorithms. (CO1, L2)

7. (a) Discuss the methodfor Divideand Conquer approach and write algorithm for Quick Sort with an example. (CO2,L6)

(Or)

(b) Discuss the general method for Greedy Method. Apply it on Single Source Shortest Path by writing analgorithm with suitable example. (CO2, L6)

8. (a) Examine algorithmand procedure of finding Optimal Binary Search Tree using Dynamic Programming with example. (CO3, L4)

(Or)

(b) Examine Traversal Techniques for Graphs with an example. (CO3, L4)

9. (a) Explain Control Abstraction for LC Search. Solve 0/1-Knapsack Problem using Branch and Bound Technique. (CO4, L5)

(Or)

(b) Explain the Sum of Subsets Problem using Back Tracking Technique. (CO4, L5)

10. (a) Make use of different formulae prove COOKs Theorem. (CO5, L3)

(Or)

(b) Choose NP-Hard Graph Problems and explain. (CO5, L3)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E2 – CRYPTOGRAPHY & NETWORK SECURITY

CourseName	Cryptography & Network Security			L	T	P	C	CIA	SEE	TM
CourseCode	22CS3E2			4	0	0	4	30	70	100
Year of Introduction: 2022	Year of Offering: 2024	Year of Revision: Nil	Percentage of Revision: Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks										

CourseDescriptionandPurpose:
The course is intended to understand and gain knowledge on Computer& NetworkSecurity, Number Theory, Classical Encryption Techniques, AdvancedEncryption Standard and RandomBitGenerationandStreamCiphers, 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 Objective:
The course aims to provide a comprehensive understanding of computer and network security, covering topics such as number theory, classical and advanced encryption techniques, public-key cryptography, digital signatures, key management, user authentication, transport level security, email and IP security, and intrusion detection, enabling students to secure digital communication and defend against cyber threats.

SpecificObjectivesinclude:
- To understand Basic Ideas about Analysis of Algorithms and the Concept of Data Structures.
- To know Divide and Conquer, Greedy Methods and Solving Various Problems by applying them.
- To apply Dynamic Programming Method and Basic Traversal and Search Techniques to solve various Problems.
- To understand Backtracking and Branch and Bound Techniques to Design Algorithms.
- To categorize NP-Hard and NP-Complete Problems.

Course Outcomes:
On successful completion the students should be able to
CO1 Demonstrate a strong understanding of fundamental cryptographic concepts and techniques.
CO2 Implement and analyse cryptographic systems.
CO3 Understand the principles of network security and its importance.
CO4 Analyse and evaluate security protocols and standards.
CO5 Apply cryptographic techniques to secure network communications.

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, And 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. **IPSecurity:** IPSecurity Overview, IPSecurity 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

PrescribedTextBook			
	Author	Title	Publisher
1	WilliamStallings	Cryptography and Network Security	Pearson, Seventh Edition, 2017

ReferenceTextBook			
	Author	Title	Publisher
1	WilliamStallings	Cryptography and Network Security	Pearson,SixthEdition, 2014
2	WilliamStallings	Network Essentials - Security Applications and Standards	Pearson Education (2007), ThirdEdition.
3	ChrisMcNab	Network Security Assessment	OReilly(2007),2nd Edition
4	JonErickson	Hacking-The Art of Exploitation	Press(2006),SPD
5	NealKrawety	Introduction to Network Security	Thomson(2007).
6	AnkitFadia	Network Security-A Hackers Perspective	Macmillan(2008)
7	Behrouz A Forouzan, Debdeep Mukhopadhyay	Cryptography and Network Security	MCGraw-Hill, IndianSpecial Edition, Third Edition, 2015

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), ThirdSemester (w.e.f. admitted batch 2022-23)

Course Name: CRYPTOGRAPHY & NETWORK SECURITY **Course Code:** 22CS3E2

Time: 3Hours **MaxMarks:70**

SECTION-A

Answer ALL Questions **(5×4=20Marks)**

1. (a) Explain Caesar Cipher. (CO1,L2)

(Or)

(b) Explain TRNGs, PRNGs. (CO1, L2)

2. (a) What is Modular Arithmetic? Explain. (CO2, L1)

(Or)

(b) Explain RSA Algorithm. (CO2, L1)

3. (a) What is Digital Signatures? (CO3, L1)

(Or)

(b) List the Distribution of Public Keys. (CO3, L1)

4. (a) Explain Handshake Protocol in TLS. (CO4, L2)

(Or)

(b) Explain Pretty Good Privacy. (CO4, L2)

5. (a) Explain Password Management Briefly. (CO5, L2)

(Or)

(b) Explain Firewall Characteristics? (CO5, L2)

SECTION-B

Answer Five Questions Choosing One Question from Each Unit.

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

6. (a) Explain various Security Attacks and Security Services. (CO1, L2)

(Or)

(b) Explain AES Encryption and Decryption Process. (CO1, L2)

7. (a) Illustrate Diffie-Hellman Key Exchange. (CO2, L2)

(Or)

(b) Explain Internal and External Error Control in Message Authentication Functions. (CO2, L2)

8. (a) Explain NIST Digital Signature Algorithm with diagram. (CO3, L5)

(Or)

(b) Explain Kerberos in detail. (CO3, L5)

9. (a) Explain Confidentiality and Authentication in S/MIME (CO5,L5)

(Or)

(b) Illustrate Overview of IP Security. (CO4, L5)

10. (a) Discuss what are the problems that may intruder create and explain how to overcome those problem? (CO5,L6)

(Or)

(b) Discuss Various Types of Firewalls. (CO5,L6)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E3 – MACHINE LEARNING

CourseName	MACHINE LEARNING	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS3E3	4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil		**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks								

CourseDescriptionandPurpose:
Machine Learning is a course that illustrates concepts of Machine Learning, Basics of Data Pre-processing and Feature Engineering, Supervised Learning Algorithms, Regression Algorithms, Unsupervised Learning Algorithms, concepts of Neural Networks.

Course Objectives:
Thiscoursewillhelp enable the students t o understand and learn various Concepts of Machine Learning, Basics of Data Pre-processing and Feature Engineering, Supervised Learning Algorithms, Regression Algorithms, Unsupervised Learning Algorithms, Concepts of Neural Networks.

SpecificObjectivesinclude:
- To know the concepts of Machine Leaning.
- To understand basics of Data Pre-processing and Feature Selection.
- To learn Supervised Learning and Regression Algorithms.
- To learn the concepts of Unsupervised Learning.
- To understand the concepts of Neural Networks.

Course Outcomes:
CO1 In this course, students will explore the foundations of machine learning, including human learning principles, various types of machine learning, programming languages and tools, and a comprehensive framework for developing and evaluating machine learning models, equipping them with the skills to build and assess sophisticated machine learning applications.

CO2 In this course, students will master the fundamentals of data pre-processing and feature engineering, encompassing techniques such as feature transformation, scaling, construction, subset selection, dimensionality reduction, explorative data analysis, and hyper parameter tuning, with a comprehensive introduction to the SK Learn package, empowering them to proficiently manipulate data and optimize machine learning models.

CO3 In this course, students will gain a deep understanding of supervised learning, covering a range of classification algorithms including Naïve Bayes, KNN, Decision Trees, Random Forest, Support Vector Machines, and XG Boost, as well as regression techniques like

Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, and Logistic Regression with Regularization (Lasso and Ridge), enabling them to build accurate predictive models for diverse real-world applications.

CO4 In this course, students will explore the principles of unsupervised learning, differentiating it from supervised learning, and delve into unsupervised learning models, dimensionality reduction techniques, clustering methods, association rule mining, and practical applications, enabling them to analyse complex, unstructured data and derive valuable insights for various domains.

CO5 In this course, students will master the fundamentals of neural networks, covering artificial neural networks, convolutional neural networks for tasks like hand digit and image classification, hyper parameter tuning techniques, and advanced topics including recurrent neural networks and Long Short-Term Memory networks, empowering them to design and optimize sophisticated deep learning models for diverse applications in computer vision and sequential data analysis.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	Introduction to Machine Learning: Human Learning and Machine Learning - Types of Machine Learning - Languages and Tools in Machine Learning - Framework for Developing Machine Learning Models - Preparing to Model - Modelling and Evaluation Metrics.	12
II	Basics of Data Pre-processing and Feature Engineering: Feature Transformation - Feature Scaling- Feature Construction and Feature Subset Selection - Dimensionality Reduction - Explorative Data Analysis - Hyper Parameter Tuning - Introduction to SK Learn Package.	12
III	Supervised Learning: Introduction - Classification (Common Classification Algorithms): Naïve Bayes,KNN, Decision Trees, Random Forest, Support Vector Machines, XGBoost. Regression(Common Regression Algorithms): Simple Linear Regression and Multiple Linear Regression - Polynomial Regression - Logistic Regression-Regularisation:Lasso and Ridge.	12
IV	Unsupervised Learning: Introduction - Unsupervised Vs. Supervised Learning - Unsupervised Learning Models - Dimensionality Reduction - Clustering: Association Rule Mining - Applications of Unsupervised Learning.	12
V	Introduction to Neural Networks: Artificial Neural Networks - Hand Digit Classification - Convolution Neural Networks - Image Classification - Hyper Parameter Tuning - Recurrent Neural Networks - Building Recurrent NN - Long Short Term Memory.	12

Reference Text Books:

1. Hastie, T., R. Tibshirani, and J. H. Friedman. , The Elements of Statistical Learning: Data Mining, Inference and Prediction, New York, NY: Springer, 2011, ISBN: 97803879
2. EthemAlphaydin, An introduction to Machine Learning, PHI Learning Private Limited, 2020
3. AurelienGeron, Hands-On Machine Learning with Scikit Learn, Keras and Tensor Flow, O'REILY -2019
4. Tom Mitchell, Machine Learning, Tata McGraw Hill, 2013
5. Francois Chollet, Deep Learning with Python, Manning , 2019

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), Third Semester (w.e.f. admitted batch 2022-23)

Course Name: MACHINE LEARNING **Course Code:** 22CS3E3

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

SECTION-A

AnswerALLquestions **(5×4=20Marks)**

1. (a) Define Machine Learning and list different Machine Learning Techniques. (CO1,L1)

(Or)

(b) What are the different tools used in Machine Learning? (CO1,L1)

2. (a) What are the techniques of Feature Scaling? (CO2,L1)

(Or)

(b) Define Dimensionality Reduction and explain its Techniques. (CO2,L1)

3. (a) What are the various algorithms used for Classification? (CO3,L1)

(Or)

(b) Define Logistic Regression. (CO3,L1)

4. (a) Explain Clustering and list out different Clustering Algorithms? (CO4, L2)

(Or)

(b) Explain the Applications of Unsupervised Learning? (CO4,L2)

5. (a) List some commercial practical applications of Artificial Neural Networks. (CO5,L1)

(Or)

(b) Define Hyper Parameter Tuning with example. (CO5,L1)

Section - B

Answer all questions.

All question carry equal marks. **5 × 10 = 50 Marks**

6. (a) Explain the workflow in Machine Leaning Problem Solving. (CO1,L2)

(Or)

(b) Explain Supervised and Unsupervised Learning with Examples. (CO1,L2)

7. (a) Discuss Feature Transmission in detail. (CO2, L6)

(Or)

(b) Discuss Feature Subset Selection and its Application. (CO2,L6)

8. (a) Explain Classification Problem in Supervised Learning and Explain Decision Tree algorithm for Classification. (CO3,L5)

(Or)

(b) Explain Linear and Multiple Linear Regression in Python Library Stats Models. (CO3,L5)

9. (a) Apply K-Means Clustering Algorithm on following X and Y values (10,34), (45,55), (23,55), (14,66), (56,25), (12,16),(14,25). (CO4,L3)

(Or)

(b) Choose suitable Algorithm in SK-Learn Package to perform Hierarchical Clustering. (CO4, L3)

10. (a) List basic features in Neuron and different types of Activation Functions. (CO5,L4)

(Or)

(b) List various parameters of Convolution Neural Networks. (CO5,L4)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E4: APPLIED DATA ANALYTICS

CourseName	Applied Data Analytics			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS4E4			4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2022	**Year of Revision**: Nil		**Percentage of Revision:** Nil						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks										

Course Description and Purpose:
Applied Data Analysis is a course that illustrates concepts ofR-Programming, Data Structures, Descriptive Statistical Analysis, Basic Graphs, Analysis of ANOVA, Multivariate Analysis, and Files& Databases.

Course Objectives:
This course will help enable the students to understand and familiar with R-Programming, Data Structures, Descriptive Statistical Analysis, Basic Graphs, Analysis of ANOVA, Multivariate Analysis, and Files& Databases.

Specific Objectives include:
- Master R-programming and data structures for effective data manipulation.
- Conduct descriptive statistical analysis to summarize and interpret datasets.
- Generate basic graphs using R for visual data representation.
- Apply ANOVA for in-depth analysis of variance within datasets.
- Learn to handle files and databases to effectively manage and retrieve data.

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

CO1 Upon completing the course students will gain a comprehensive proficiency in utilizing R for data analysis, mastering R environment, working with packages, understanding, manipulating, and cleaning diverse datasets, employing various data types and structures, handling missing values, sorting and merging data, sub setting datasets, implementing control flow statements, and performing aggregation and restructuring operations, empowering them to apply advanced data analysis techniques for solving complex real-world problems.

CO2 Upon completion of the course, students will acquire a comprehensive understanding of measures of central tendency, dispersion, and shapes, various sampling techniques, hypothesis testing methods including parametric and non-parametric tests, enabling them to effectively analyse and interpret data, make informed decisions, and contribute meaningfully to statistical research and applications.

CO3 Upon completion of the course on "Basic and Advanced Data Visualization, and Analysis of Variance," students will proficiently create a wide array of graphical representations using bar plots, pie charts, histograms, line plots, dot plots, kernel density plots, and utilize advanced visualization techniques with the ggplot2 package, while also mastering the application of various ANOVA models, including one-way ANOVA, one-way ANCOVA, two-way factorial ANOVA, repeated measures ANOVA, and multivariate analysis of variance (MANOVA), enabling them to visually and statistically analyse complex datasets and draw meaningful insights for research and decision-making purposes.

CO4 Upon completion of the course on "Basic Multivariate Analysis, Time Series Analysis, and Forecasting," students will gain a comprehensive understanding of regression techniques including simple linear regression, multiple linear regression, and logistic regression, along with proficiency in time series analysis encompassing the creation and decomposition of time series, exponential models, and forecasting methods such as simple moving averages, weighted moving averages, and single exponential smoothing, empowering them to analyse multivariate data, model time-dependent patterns, and make accurate predictions for diverse real-world applications.

CO5 Upon completion of the course on "Connecting R to External Interfaces," students will proficiently import and export data between R and various external sources including CSV files, Microsoft Excel spread sheets, databases (MySQL) for creating, querying, and managing tables, XML and JSON files for structured data exchange, as well as binary files, enabling them to seamlessly interface R with diverse data formats and sources for effective analysis and manipulation.

Syllabus

Unit	Learning Units	Lecture Hours
I	**Introduction to R:** Why use R?, R Environment, Working with R Packages, Understanding Datasets, Data Types, Data Structures (Operations on Data Structures), Missing Values, Sorting Data, Merging Datasets, Sub setting Datasets, Control Flow Statements, Aggregation and Restructurings.	12
II	**Descriptive Statistics:** Introduction to Descriptive Statistics (Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes (Skewness and Kurtosis)), Introduction to Sampling(Sampling Types), Hypothesis Testing with R(One Sample Test, One Sample Sign Test, Two Samples Test), Parametric Test(Correlations, Z-Test, T-Test), Non Parametric Tests (Wilcoxon Signed- Rank Test, Chi Square Test).	12
III	**Basic Graphs:** Bar Plots, Pie Charts, Histograms, Line, Dot Plots, Kernel Density Plots and Dot Plots. **The Advanced Graphics:** The ggplot2 Package. **Analysis of Variance:** Fitting ANOVA Models, One-way ANOVA, One-way ANCOVA, Two-way factorial ANOVA, Repeated Measures ANOVA, Multivariate Analysis of Variance (MANOVA)	12
IV	**Basic Multivariate Analysis**: Regression (Simple Linear Regression, Multiple Linear Regression, Logistic Regression), Time Series Analysis (Creating Time Series, Components of Time Series Analysis, Seasonal Decomposition, Exponential Models), Forecasting (Simple Moving Averages, Weighted Moving Averages, Single Exponential Smoothing.)	12

V	**Connecting R to External Interfaces**: CSV Files (Reading From a CSV File, Writing to a CSV File), Microsoft Excel (Reading from XLSX File, Writing to XLSX File), Databases (Connecting R to MYSQL, Creating Tables, Inserting Rows, Updating Rows, Deleting Rows, Querying Rows, Querying Tables, Dropping Tables), XML Files (Reading From XML Files, JSON Files, Reading From JSON Files), Binary Files (Writing to Binary Files, Reading From Binary Files).	12

Prescribed Text Book			
	Author	Title	Publisher
1	Dr. Rob Kabacoff	R in Action: Data Analysis and Graphics with R. [UNIT-I ,UNIT-II ,UNIT-III]	Manning Publications Co, Edition 2011.
2	Dr.Jeeva Jose	A Beginners Guide For Data Analysis Using R Programming. (UNIT IV and UNIT V) UNI IV: Chapter-11 11.3 [11.3.1 to 11.3.3] 11.5,11.6 [11.6.1 to 11.6.3] UNIT V: Chapter-6 [6.1 to 6.6]	Khanna Book Publishing Co.(P) Ltd, Edition 2019.

Reference Text Books			
	Author	Title	Publisher
1	Dr. DhavalMaheta	Data Analysis using R	Notion Press, September 2021
2	Michael J.Crawley	The R Book	Wiley, Edition: 2007
3	Ken Black John	Business Statistics for Contemporary Decision Making	Wiley & Sons, Inc., Edition 2013

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), Third Semester(w.e.f admitted batch 2022-23)

Course Name: Applied Data Analytics **Course Code: 22CS3E4**

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

SECTION-A

AnswerALLquestions **(5×4=20Marks)**

1. (a)What are the different *DataTypes* used in R. (CO1, L1)

(or)

(b) Define *Subsetting* and *Merging*. (CO1, L1)

2. (a) How to remove missing values in R? (CO1, L1)

(or)

(b) What is meant by *Random Sampling* and *Non Random Sampling*? (CO3, L1)

3. (a) What is *Correlation*? Explain its types (CO3, L1)

(or)

(b) What is meant by t-test and f-test? Give one example using R (CO3.L1)

4. (a) What is the purpose of ANOVA? (CO4, L1)

(or)

(b) Define *Logistic Regression. Give one* example using R. (CO2, L1)

5. (a) DefineTime Series Analysis and its components. (CO2, L1)

(or)

(b) What is the syntax used to read *XML Files*. (CO6,L1)

SECTION-B

Answer Five Questions Choosing One Question from each unit.

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

6. (a)Outline the different *Data Structures* used in R. (CO1, L2)

(or)

(b) Explain *Control Flow Statements* in R. (CO1, L2)

7. (a) Explain the different statistical measures used in *Descriptive Statistics*. (CO3, L5)

(or)

(b) Explain *Non-Parametric Test* and *Wilcoxon Signed-Rank Test* in R (CO3, L5)

8. (a) List *Various Types of Charts* in R. (CO6, L4)

(or)

(b) Analyze*One-way ANOVA* and *Two-way factorial ANOVA*. (CO4, L4)

9. (a) Distinguish *Simple* and *Multiple Regression* in R with Example. (CO2, L4)

(or)

(b) Classify various components used in *Time Series Analysis in R* with example. (CO3, L4)

10.(a) Explain procedure to *connect to a database* in R using MYSQL with an example. (CO6, L5)

(or)

(b) Explain procedure to import *.csv file* and *binary file* in R with an example. (CO6, L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E5 – INTERNET OF THINGS (IOT)

CourseName	Internet of Things (IOT)			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS3E5			4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks										

Course Descriptive and Purpose:
This course aims to provide students with a comprehensive understanding and knowledge of various aspects of the Internet of Things (IoT). These areas of focus include an overview of IoT, models and layers in IoT systems, standardization efforts, protocols and design principles applicable to connected devices, principles of internet connectivity within IoT, a deep dive into IoT protocols and application layer protocols, techniques for acquiring IoT data, and an exploration of business models and processes relevant to IoT applications.

Course Objectives:
The course help the students to understand and gain knowledge on Over View of Internet of Things, Models, Layers & Standardization, Protocols & Design Principles for Connected Devices, Internet Connectivity Principles, Protocols & Application Layer Protocols, Data Acquiring, Business Models and Business Processes.

Specific objectives include:
- To attain knowledge over view of Internet of Things.
- To understand Models, Layers & Standardization.
- To apply Protocols & Design Principles for Connected Devices.
- To understand Internet Connectivity Principles, Protocols & Application Layer Protocols.
- To understand Data Acquiring, Business Models and Business Processes.

Course Outcomes:
On successful completion

CO1 This course provides a comprehensive understanding of the Internet of Things (IoT), covering its technology, sources, M2M communication, real-world examples, design principles for connected devices, and business models, enabling students to navigate and contribute to the IoT ecosystem effectively.

CO2 This course equips students with a deep understanding of design principles for connected devices in IoT/M2M systems, including OSI stack modifications, ETSI M2M domains, communication technologies, data management, and affordability considerations, enabling them to design and manage efficient and cost-effective IoT solutions.

CO3 This course imparts design principles and knowledge of web connectivity for connected devices, covering web communication protocols, message communication protocols, and practical web connectivity techniques, enabling students to create effective web-connected device solutions.

CO4 This course equips students with the skills to acquire, organize, and analyse data in IoT/M2M contexts, covering data acquisition, storage, business processes, and integration into enterprise systems, facilitating their ability to leverage IoT data for applications, services, and business processes effectively.

CO5 This course empowers students to master data acquisition, organization, and analytics within IoT/M2M, enabling them to drive innovative applications, services, and business processes while efficiently integrating data into enterprise systems.

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. **Internet Connectivity Principles:** Introduction, Internet Connectivity, Application Layer Protocols: *HTTP, HTTPS, FTP, Telnet.*	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

PrescribedTextBook

	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 Internetof Things.	Oreilly

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), Third Semester(w.e.f. admitted batch 2022-23)

Course Name: Internet of Things (IOT) **Course Code: 22CS3E5**

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

SECTION-A

Answer ALL questions **(5×4=20Marks)**

1.(a) Explain M2M communication. (CO1, L2)

(or)

(b) Explain Internet of Things Technology. (CO1, L2)

2.(a) What is Gateway. (CO2, L1)

(or)

(b) List out Communication Technologies for IoT. (CO2, L1)

3.(a) What is Communication Protocol? (CO3, L1)

(or)

(b) List out Application Layer Protocols. (CO3, L1)

4.(a) Explain Business Processes for IoT. (CO4, L2)

(or)

(b) Explain Organizing Data in IoT. (CO4, L2)

5.(a) Explain Transactions for Business Processes. (CO5, L2)

(or)

(b) Explain Active and Passive Devices. (CO5, L2)

SECTION-B

Answer Five Questions Choosing One Question from each unit.

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

6. (a) Explain overview of Internet of Things. (CO1, L2)

(or)

(b) Explain Design Principles for Connected Devices. (CO1, L2)

7. (a) Apply IoT / M2M Designs Standardizations with examples. (CO2, L3)

(or)

(b) Build Modified OSI Stack for the IoT / M2M Systems. (CO2, L3)

8. (a) What are Design Principles for the Web Connectivity. (CO3, L1)

(or)

(b) What are Message Communication Protocols for Connected Devices. (CO3, L1)

9. (a) Explain IOT / M2M Data Acquiring and Storage. (CO4, L2)

(or)

(b) Explain IoT Business Models for Business Processes with example. (CO4, L2)

10. (a) Explain Applications and Service Business Processes for IoT. (CO5, L5)

(or)

(b) Explain Integration and Enterprise Systems. (CO5, L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3E6 – BLOCK CHAIN TECHNOLOGY

Course Name	BLOCK CHAIN TECHNOLOGY		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22CS3E6		4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil			**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks									

CourseDescriptionandPurpose:
This course provides a comprehensive overview of block chain technology, covering its necessity, operational processes, limitations, Bit coin decentralization, Bit coin and Ethereum storage and usage, smart contracts, real-world block chain applications, mining consensus mechanisms, and security considerations.

Course Objectives:
Block Chain Technology is a course that illustrates Block Chain Need, Working Process of Block Chain, Limitations of Block Chain Technology, Decentralization of Bit coin, Storage and usage of Bit coins, Ethereum and Smart Contracts, Block Chain Applications, Mining Consensus and Bit coin Security.

Specificobjectivesinclude:
1. To understand basic concepts of Block chain & Limitations.
2. To learn How Bit coin Achieves Decentralization.
3. To familiar with How to Store Bit coins and How to Use Bit coins.
4. To know Ethereum and Smart Contracts and Block chain Applications.
5. To gain knowledge on Mining Consensus and Bit coin Security.

Course Outcomes:
Upon successful completion of the course

CO1 Students will have a comprehensive understanding of block chain technology, including its need in addressing core problems, the workings of public and private ledgers, the mechanics of block chain, such as hashing data, user account protection, transaction authorization, and data store security, as well as the limitations of block chain technology and potential avenues for innovation and improvement in the field.

CO2 Students will possess a thorough understanding of how Bit coin achieves decentralization, including the distinctions between centralized and decentralized systems, the concept of distributed consensus, the mechanics of Bit coin transactions and scripts, and the role of Bit coin blocks in maintaining a decentralized ledger, enabling them to grasp the fundamental principles of block chain technology and crypto currency.

CO3 Students will be well-equipped to store and use Bit coins effectively, understanding various storage methods, including local storage, hot and cold storage, and key

management techniques. They will also gain proficiency in using Bit coins through online wallets, exchanges, payment services, and currency exchange markets, enabling them to navigate the crypto currency ecosystem securely and efficiently.

CO4 Students will have a comprehensive understanding of Ethereum, smart contract programming, and various block chain applications, including Name coin, gas incentives, security considerations, data structures in Ethereum, and applications such as coloured coins, Counterparty, payment channels, and state channels, equipping them to design and implement block chain-based solutions for diverse use cases.

CO5 Students will have a deep understanding of mining consensus in block chain networks, including decentralized consensus mechanisms, transaction verification, block mining, and consensus security considerations. Additionally, students will be well-versed in Bit coin security principles and user best practices for securing crypto currency assets, enabling them to engage with block chain technologies securely and effectively.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Why Block chain is Need:** Discovering the Core Problem - Public Ledgers - Block in Block chain - Public versus Private Block chain. **How Block chain Works:** Planning the Block chain - Hashing Data - Identifying & Protecting user Accounts - Authorizing Transactions - Using Data Store - Protecting Data Store - Choosing Transaction History - Paying for Integrity. **Limitations:** Seeing the Limitations - Reinventing the Block Chain.	12
II	**How Bit coin Achieves Decentralization:** Centralized versus Decentralization - Distributed Consensus - Bit coin Transactions - Bit coin Scripts - Applications of Bit coin Scripts - Bit coin Blocks.	12
III	**How to Store Bit coins:** Simple Local Storage - Hot and Cold Storage - Splitting and Sharing Keys. **How to Use bit coins:** Online Wallets and Exchanges - Payment Services - Transaction Fees - Currency Exchange Markets.	12
IV	**Ethereum and Smart Contracts:** Smart Contract Programming Model, Name coin in Ethereum, Gas Incentives and Security, Data Structures in Ethereum. **Block chain Applications:** Applications from Building Blocks, Coloured Coins, Counterparty, Payment Channels and State Channels, Routed Payment Channels.	12
V	**Mining Consensus:** Decentralized Consensus - Independent Verification of Transactions - Mining Nodes - Aggregating Transactions into Blocks - Mining the Block - Validating a New Block - Assembling and Selecting Chains of Blocks - Consensus Attacks. **Bit coin Security:** Security Principles - User Security Best Practices.	12

Prescribed Text Book			
	Author	Title	Publisher
1	Daniel Drescher	Blockchain Basics	A Press, Second Edition, 2017
2	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Princeton University Press, 2016, Second Edition
3	Andreas M Antonopoulos	Mastering Bitcoin: Unlocking Digital Crypto Currencies	ORELLY,2015

Reference Text Book			
	Author	Title	Publisher
1	Melanie	Blockchain : Blue Print for New Economy	ORELLY,2015

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

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc. (Computer Science), Third Semester(w.e.f. admitted batch 2022-23)

Course Name: Block Chain Technology **Course Code:** 22CS3E6

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

SECTION-A

Answer ALL questions **(5×4=20Marks)**

1. (a) What is reinventing the Block Chain? (CO1,L1)

(Or)

(b) How to use Data Store? (CO1,L1)

2. (a) Explain Block in Block Chain.(CO2,L2)

(Or)

(b) Explain Script. (CO2,L2)

3. (a) What is Splitting? (CO3,L1)

(Or)

(b) What is Transaction? (CO3,L1)

4. (a) Explain Payment Channel. (CO4,L2)

(Or)

(b) Explain Coloured Coin. (CO4,L2)

5.(a) What is Mining Node? (CO5,L1)

(Or)

(b) What are Security Principles? (CO5,L1)

SECTION-B

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

6. (a) Explain Public Ledger, Public& Private Block Chains. (CO1,L2)

(Or)

(b) Explain identifying and protecting User Accounts and Authorize Transactions. (CO1,L2)

7. (a) Apply Centralized & Decentralized in Bit coin in applications. (CO2,L3)

(or)

(b) Build Bit coin Scripts and their Applications. (CO2,L3)

8. (a) What are Hot & Cold Storages? Explain in detail. (CO3,L1)

(Or)

(b) How bit coins are used in online Wallets & Exchanges and payment services? (CO3,L1)

9. (a) Explain Smart Contract Programming Model & Data Structures in Ethereum.(CO4,L2)

(Or)

(b) Write about Applications from Building Blocks and Coloured Coins.(CO4,L2)

10. (a) Explain Mining, Validating, Assembling and Selecting Chains of blocks. (CO5,L5)

(Or)

(b) Explain the Security Principles in Bit coin Security.(CO5,L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3L1 – DATA SCIENCE LAB

CourseName	DATA SCIENCE LAB			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS4L1			0	0	6	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks										

Course Description and Purpose:
Data Science Lab is a course that illustrates concepts of Tableau Installation, Introduction, Exploring, Data Blending, Uni-variate Charts, Bi-variate Charts, Multi-variate Charts, Trend Line, Word cloud, Bubble Chart, Creating a Simple Dash Board, Creating Maps, Creating a Dash Board, Creating a Story and Data Munging, Importing Graphs, Group and Aggregate Data, Create a Dash Board in Power BI.

Course Objectives:
The Data Science Lab course aims to provide comprehensive knowledge and practical skills in Tableau and Power BI, covering installation, data exploration, visualization techniques, dashboard creation, and data munging, enabling students to proficiently analyse and present complex data sets.

Specific objectives include:
- To implement Tableau Installation, Introduction, Exploring.
- To implement Data Blending.
- To implement Uni-variate Charts, Bi-variate Charts, Multi-variate Charts.
- To implement Trend Line, Word cloud, Bubble Chart.
- To implement creating a Simple Dash Board, Creating Maps, Creating a Dash Board, Creating a Story and Data Munging, Importing Graphs, Group and Aggregate Data, Create a Dash Board in Power BI.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1 Implement tableau Installation, Introduction, Exploring.
CO2 Implement Data Blending.
CO3 Implement Uni-variate Charts, Bi-variate Charts, Multi-variate Charts.
CO4 Implement Trend Line, Word Cloud, Bubble Chart.
CO5 To implement creating a Simple Dash Board, Creating Maps, Creating a Dash Board, Creating a Story and Data Munging, Importing Graphs, Group and Aggregate Data, Create a Dash Board in Power BI.

Lab Cycle:

Tableau

1. Tableau installation. (CO1,L1)
2. Tableau Introduction / Exploring Tableau. (CO1,L1)
3. Data Blending. (CO2,L3)
4. Creating Univariate charts
    a) Bar Chart. (CO3,L3)
    b) Pie Chart. (CO3,L3)
    c) Line Charts
    d) Box plots
5. Dual Axis Chart. (CO3,L3)
6. Shared Axis. (CO3,L3)
7. Creating Bivariate Charts
    a) Cross Tab. (CO3,L3)
    b) Scatter Plot. (CO3,L3)
    c) Trend Line. (CO3,L3)
8. Creating Multi-variate Charts
    a) Dual Axis Chart. (CO3,L3)
    b) Area charts(CO3,L3)
9. Word Cloud. (CO4,L3)
10. Bubble Chart. (CO4,L3)
11. Creating a Simple Dash Board. (CO5,L3)
12. Creating Maps. (CO5, L3)
13. Creating a Dash Board. (CO5, L3)
14. Creating a Story. (CO5, L3)

Power BI:

1. Getting data from web. (CO4, L3)
2. Natural Language Queries. (CO4, L3)
3. Importing Data from North wind ODATA feed T3_IMF. (CO4, L3)
4. Functions & list Dates in Power Bi. (CO4, L3)
5. Group By and unpivot in Power Bi. (CO4, L3)
6. Merging Queries in Power Bi. (CO4, L3)
7. IPL Statistics in Power Bi. (CO4, L3)
8. Merging Queries in Power Bi. (CO4, L3)
9. Append Query in Power Bi. (CO4, L3)
10. Charts in Power Bi (CO5,L3)
11. Data Modelling in Power Bi.(CO5,L3)
12. Dashboard for Corona Cases Analysis. (CO5,L3)

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.

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS3L2: MACHINE LEARNING LAB

CourseName	MACHINE LEARNING LAB		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS3L2		0	0	6	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks									

Course Description and Purpose:
Machine Learning Lab is a course that illustrates concepts of Load Data Sets from Different Sources, Basics of Data Pre-processing and Feature Selection, Supervised Learning and Regression Algorithms, Supervised Learning and Classification Algorithms, Concepts of Clustering Algorithms.

Course Objectives:
This course will help enable the students to understand learn, apply / implement the Load Data Sets from Different Sources, Basics of Data Pre-processing and Feature Selection, Supervised Learning and Regression Algorithms, Supervised Learning and Classification Algorithms, Concepts of Clustering Algorithms.

The learning objectives include:
- To know the concepts of Load Data Sets from different Sources.
- To understand basics of Data Pre-processing and Feature Selection.
- To learn Supervised Learning and Regression Algorithms.
- To learn Supervised Learning and Classification Algorithms.
- To understand the concepts of Clustering Algorithms.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1 Know the concepts of Load Data Sets from Different Sources.
CO2 Understand basics of Data Pre-processing and Feature Selection.
CO3 Learn Supervised Learning and Regression Algorithms.
CO4 Learn Supervised Learning and Classification Algorithms.
CO5 Understand the concepts of Clustering Algorithms.

LAB LIST:

1. Write a program to open Data Sets in Python. (CO1,L1)
2. Explain various *Plotting Techniques* of Python. (CO2, L2)
3.

REGRESSION ALGORITHMS

4. Demonstrate Simple Linear Regression in Python with Sample Data Sets. (CO3,L2)
5. Demonstrate Multiple Linear Regression in Python with Sample Data Sets. (CO3,L2)
6. Demonstrate Decision Tree Regression in Python with Sample Data Sets. (CO3,L2)
7. Demonstrate Support Vector Regression in Python with Sample Data Sets. (CO3,L2)
8. Demonstrate Random Forest Regression in Python with Sample Data Sets. (CO3,L

CLASSIFICATION ALGORITHMS

9. Demonstrate Logistic Regression in Python with Sample Data Sets. (CO4,L2)
10. Demonstrate Support Vector Classification in Python with Sample Data Sets. (CO4,L2)
11. Demonstrate Random Forest Classification in Python with Sample Data Sets. (CO4,L2)

CLUSTERING ALGORITHMS

12. Demonstrate K-Means Clustering with Sample Data Sets. (CO5,L2)
13. Demonstrate Hierarchical Clustering with Sample Data Sets. (CO5,L2)

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.

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

23OE301 – R PROGRAMMING

CourseName	R PROGRAMMING		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22OE301		3	0	0	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

Course Description and Purpose:
This course provides a comprehensive understanding of R programming, descriptive statistics, bi-variate analysis, regression, analysis of variance, hypothesis testing, parametric and non-parametric tests, and connecting R to external interfaces for practical data analysis and interpretation. This course equip learners with essential skills in R programming and statistical analysis, enabling them to manipulate data, conduct hypothesis tests, perform regression analysis, and connect R to external interfaces for robust decision-making in various fields.

Course Objectives:
This course will help the students to learn about Introduction to RProgramming, Descriptive Statistics and Bi-variate Analysis using R, Regression Using R, AnalysisofVariance Using R, Testing of Hypothesis Using R, Parametric Tests, Non Parametric Tests and Connecting R to External Interfaces.

Specificobjectivesinclude:
- To provide an understanding on Introduction to R Programming.
- To learn Descriptive Statistics and Bi-variate Analysis using R
- To gain knowledge on Regression Using R and Analysis of Variance Using R.
- To lean about Testing of Hypothesis Using R, Parametric Tests and Non Parametric Tests.
- To provide understanding on Connecting R to External Interfaces.

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

CO1 By mastering R programming fundamentals, data manipulation techniques, and statistical functions, students will gain the ability to explore, analyse, and visualize diverse datasets effectively, making informed decisions through a variety of data representation methods.

CO2 Students will develop expertise in descriptive statistics, mastering measures of central tendency, dispersion, and correlation, enabling them to analyse diverse data sets, discerns patterns, and makes informed decisions in both categorical and numerical contexts.

CO3 Students will master regression techniques (simple linear, multiple linear, and logistic) and ANOVA methods (one-way, two-way, multivariate, and repeated measures), enabling them to model complex relationships and conduct in-depth analysis of variance in diverse datasets using R programming.

CO4 Students will acquire expertise in hypothesis testing methodologies, mastering the steps and types of hypothesis testing, as well as parametric tests (t-test, z-test, f-test) and non-parametric tests (Mann-Whitney U test, Kruskal-Wallis test, Chi-Square test), empowering them to assess and draw valid conclusions from a wide array of data sets using R programming.

CO5 Students will gain the ability to seamlessly connect R to external interfaces, including CSV files, Microsoft Excel, databases (MySQL), XML files, and JSON files, enabling them to efficiently import, export, manipulate, and analyse data from diverse sources, enhancing their data integration and analysis capabilities.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Introduction to RProgramming:** Why use R?, R Features, R Environment, Working with R Packages, Define Dataset, Data Types using R, Data Structures using R, Missing Values, Sorting Data, Merging Datasets, Sub setting Datasets, Operators in R, Important Statistical Functions in R, Exploratory Data Analysis - Bar Chart, Pie Chart, Histogram, Line Plot, Box Plot, Scatter Plot and Density Plot.	12
II	**Descriptive Statistics and Bi-variate Analysis using R:** Introduction to Descriptive Statistics Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes-Skewness and Kurtosis,Correlation Meaning - Types of Correlation-Measures of Correlation - Scatter Diagram, Karl Pearson's Coefficient of Correlation,Spearman's Rank Correlation Coefficient, Bi Serial Correlation, Bi-variate Analysis of Categorical Variables and Numerical Variables.	12
III	**Regression Using R:** Estimation the Method of Least Square, Introduction to regression, Types of Regression Models-Simple Linear Regression, Multiple Linear Regression, Logistic Regression and its implementation using R Programming **Analysis of Variance Using R**: Definition of ANOVA, Types of ANOVA – Oneway ANOVA - Two way ANOVA - Multivariate Analysis of Variance (MANOVA) and Repeated Measure ANOVA.	12
IV	**Testing of Hypothesis Using R:** Definition of Hypothesis Testing, Steps in Testing of Hypothesis, Types of Hypothesis Testing - Null Hypothesis, Alternative Hypothesis and Statistical Hypothesis. **Parametric Tests:** t-test, z-test and f-test, Differences between t-test and z-test. **Non Parametric Tests:** The Mann Whitney U Test, Kruskal WallisTest andChi Square Test	12
V	**Connecting R to External Interfaces**: CSV Files (Reading From a CSV File, Writing to a CSV File) - Microsoft Excel (Reading from XLSX File, Writing to XLSX File) - Databases (Connecting R to MYSQL (Creating Tables, Inserting Rows, Updating Rows, Deleting Rows, Querying Rows, Querying Tables, Dropping Tables)) - XML Files (Reading From XML Files, JSON Files, Reading From JSON Files).	12

Reference Text Book			
	Author	Title	Publisher
1	Sharma,J.K	Business Statistics	Pearson Education,2013
2	Anderson,D.,Sweeney,D.,Williams,T.,Camm,J.,& Cochran,J	Statistics for Business and Economics	CengageLearning,2013
3	Dr. Rob Kabacoff	R in Action: Data Analysis and Graphics with R	Manning Publications CO, Edition 2011
4	Dr.Jeeva Jose	A Beginners Guide for Data Analysis Using R Programming	Khanna Book Publishing Co.(P) Ltd, Edition 2019
5	MichaelJ.Crawley,JohnWiley& Sons	Statistics: An Introduction using R	Weily, 2015
6	Aczel,A.D.&Sounderpandian,J	Complete Business Statistics	TataMcGrawHill,2011
7	Davis,G.,&Pecar,B	Business Statistics using Excel	Oxford University Press, 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) –Third Semester(w.e.f. admittedbatch2022-23)

Course Name: R-Programming (Open Elective) **Course Code:** 22OE301

SECTION-A

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

AnswerALLquestions **(5×4=20Marks)**

1. (a)What are the different *Data Types* used in R?(CO1,L1)

(Or)

(b) What are the important statistical functions used in R.?(CO1, L1)

2. (a) Explain about Skewness as a measure of shape in Descriptive Statistics (CO2,L2)

(Or)

(b) Explain about Types of Correlations used in R (CO2, L2)

3. a) Explain about Logistic Regression used in R CO3,L5)

(Or)

b) Explain about MANOVA used in R (CO3,L5)

4. (a) What are the different steps used in hypothesis testing? (CO4.L1)

(Or)

(b) What is meant by f-test with example? (CO4,L1)

5. a) How can we insert data into R using MYSQL? (CO5,L2)

(Or)

b) Explain process of reading data from XML file with example (CO5, L2)

SECTION-B

AnswerFiveQuestionsChoosingOneQuestionfromEachUnit.

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

6. (a) Outline the different *Data Structures* used in R. (CO1,L2)

(Or)

(b) Explain about different Operators in R. (CO1,L2)

7. (a) Explain measure of central tendency and measure of dispersion used in*Descriptive Statistic*s (CO2,L2)

(Or)

(b) Explain Bi-variate Analysis of Categorical Variables and Numerical Variables using R with examples**.** (CO2,L2)

8. (a)Apply Simple Linear Regression and Multiple Linear Regression using R.(CO3,L3)

(Or)

(b) Construct One Way ANOVA and Two Way ANOVA using R. (CO3, L3)

9. (a)Explain different Types of Hypothesis Testing used in R.(CO4,L2)

(Or)

(b) Explain about z-test and its types used in R with examples.(CO4,L2)

10. (a)Explainprocess of Reading and writing data from CSV and Excel files with examples.(CO5,L5)

(Or)

(b) How do you connect to a database in R using MYSQL? Give one example (CO5, L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

23OE302 – MOBILE NETWORKS

Course Name	MOBILE NETWORKS			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22OE302			3	0	0	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks										

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

Course Objectives:
This course will help the students to learn about basic concepts of Computer Networks, TCP/IP Protocol & Internet Protocol, Types of Cellular Networks, MANETS and Wireless Sensor Networks.

Specificobjectivesinclude:
- To provide understanding of the basic concepts of Computer Networks.
- To gain knowledge on TCP/IP Protocol & Internet Protocol.
- To understand various types of Cellular Networks.
- To gain knowledge on MANETS.
- To provide basic knowledge on Wireless Sensor Networks.

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

CO1 To demonstrate a comprehensive understanding of computer networks, including LANs and VANs, network devices, various network topologies, and the role of hubs in network communication.

CO2 Acquire deep understanding of the TCP/IP protocol stack, the uses and functions of TCP protocols, and will be able to discern and explain the key differences between IPv4 and IPv6 addressing schemes.

CO3 Have a comprehensive knowledge of the evolution of mobile communication networks from 1G to 5G, including their distinctive features, an understanding of GSM architecture, and insight into GPS architecture.

CO4 Proficient in identifying MANETs, providing examples of MANET applications, recognizing the issues and challenges associated with MANETs, and understanding the practical applications of MANET technology.

CO5 Capable of defining wireless sensor networks, articulating their advantages and applications, comprehending the concept of the Internet of Things (IoT), and explaining the integration of IoT with wireless sensor networks for various practical scenarios.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Computer Networks:** LAN, VAN, Network Device, Hubs, Networks Topologies.	12
II	**TCP/IP:** TCP/IP Protocol Stack, Uses & Functions of TCP Protocols, Difference between IPV4 and IPV6.	12
III	**Cellular Networks:** 1G, 2G, 3G, 4G and 5G and Features of these Networks, GSM Architecture, GPS Architecture.	12
IV	**MANETS:** MANETS, Examples of MANETS, Issues and Challenges of MANETS, Application of MANETS.	12
V	**Wireless Sensor Networks:** Wireless Sensor Networks, Advantages and uses of Wireless Sensor Networks, IOT, Integration of IOT with Wireless Sensor Networks.	12

Reference Text Book			
	Author	Title	Publisher
1	Andrew S.Tanenbaum	Computer Networks	5th Edition, Pearson, 2010

References:

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

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) –Third Semester(w.e.f. admittedbatch2022-23)

Course Name: Mobile Networks **Course Code:** 22OE302

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

SECTION-A

Answer ALL Questions **(5×4=20Marks)**

1.(a)Explain LAN. (CO1,L2)

(Or)

(b) Explain Hubs. (CO1,L2)

2. (a) What is Protocol? Explain TCP/IP Protocol Stack. (CO2,L1)

(Or)

(b) List out and explain Functions of TCP Protocols. (CO2,L1)

3.(a) What are the differences between4G and 5G Networks. (CO3,L1)

(Or)

(b) List out the services of GSM. (CO3,L1)

4.(a) Explain Applications of MANETS. (CO4,L2)

(Or)

(b) Explain MANETS briefly. (CO4,L2)

5.(a) Explain advantages of Wireless Sensor Networks. (CO5,L2)

(Or)

(b) Explain IOT.(CO5,L2)

SECTION-B

Answer Five Questions Choosing One Question from each unit.

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

6. (a) Explain about VAN and its working. (CO1,L2)

(Or)

(b) Explain different Networks Topologies. (CO1,L2)

7. (a) Divide various Protocols in TCP/IP Protocol Stack. (CO2.L4)

(Or)

(b) Differentiate IPV4 and IPV6. (CO2, L4)

8. (a) What is cellular network? Explain features of 1G, 2G and 3G Networks. (CO3,L1)

(Or)

(b) What is GPS? Explain GPS Architecture. (CO3,L1)

9. (a) Explain in detail aboutMANETS. (CO4,L2)

(Or)

(b) Explain Issues and Challenges of MANETS. (CO4,L2)

10. (a) Explain about Wireless Sensor Networks. (CO5,L5)

(Or)

(b) Explain process of Integration of IOT with Wireless Sensor Networks. (CO5,L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

23OE303 – UNIX PROGRAMMING

Course Name	UNIX PROGRAMMING			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22OE303			3	0	0	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks										

Course Descriptive and Purpose:
UNIX is to provide simple, powerful tools that can be combined to perform complex tasks. It features a command-line interface that allows users to interact with the system through a series of commands, rather than through a graphical user interface (GUI).

Course Objectives:
This course will help the students to learn about fundamental concepts of UNIX, UNIX File System, Shell Programming and Process Concepts.

Specificobjectivesinclude:
- To provide an understanding of the Basics of UNIX, Commands and Basic File System.
- To learn various Loops in Shell Programming
- To apply Filters.
- To learn Shell Programming.
- To provide understanding on Probability Distributions and Statistics using R.

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

CO1 Have a comprehensive understanding of UNIX, including its history, components, basic commands, command substitution, and the ability to effectively use Unix for various tasks.

CO2 Possess a comprehensive knowledge of UNIX file systems, including understanding file basics, directories, permissions, I Nodes, file attributes, and how to manipulate file permissions, ownership, and group associations effectively.

CO3 Proficient in using various UNIX filters, including the Grep family, Sed, and AWK, to search, process, and manipulate text data, making you capable of working efficiently with UNIX text files.

CO4 Have a comprehensive understanding of shell programming in UNIX, including variables, control structures, commands, and debugging techniques, enabling you to create and manage shell scripts effectively.

CO5 Possess a deep knowledge of UNIX processes, including their types, creation, management, and job control, empowering you to efficiently work with and manipulate processes in a UNIX environment.

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**Introduction to Unix:** Brief History, What is Unix, Unix Components, Using Unix, Commands in Unix, Some Basic Commands, Command Substitution, Giving Multiple Commands. **The File System:** The Basics of Files, what's in a File, Directories and File Names, Permissions, INodes, The Directory Hierarchy, File Attributes and Permissions, The File Command, Knowing the Filetype, The Chmod Command, Changing File Permissions, The Chown Command, Changing the Owner of a File, The Chgrp Command, Changing the Group of a File.	12
II	**Using the Shell:** Command Line Structure, Met Characters, Relating New Commands, Command Arguments and Parameters, Program Output as Arguments, Shell Variables, More on I/O Redirection, Looping in Shell Programs.	12
III	**Filters:** The Grep Family, Other Filters, The Stream Editor Sed, The AWK Pattern Scanning and Processing Language, Good Files and Good Filters	12
IV	**Shell Programming:** Shell Variables, The Export Command, The Profile File a Script Run During Starting, The First Shell Script, The Read Command, Positional Parameters, The $? Variable, Knowing the Exit Status,More about the Set Command, The Exit Command, Branching Control Structures, Loop Control Structures, The Continue and Break Statement, The Expr Command: Performing Integer Arithmetic, Real Arithmetic in Shell Programs, The here Document(<<), The Sleep Command, Debugging Scripts, The Script Command, The Eval Command, The Exec Command.	12
V	**The Process:** The Meaning, Parent and Child Processes, Types of Processes, More about Foreground and Background Processes, Internal and External Commands, Process Creation, The Trap Command, The Stty Command, The Kill Command, Job Control.	12

Reference Text Book

	Author	Title	Publisher
1	W.Kernighan&RobPike	The Unix Programming Environment by Brain	Pearson, 1st Edition, 1984
2	M.G.Venkatesh Murthy	Introduction to Unix Shell Programming	Pearson, 1st Edition, 2005
3	B.M.Harwani	Unix and Shell Programming	OXFORD University Press, 2013

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) –Third Semester(w.e.f. admittedbatch2022-23)

Course Name: UNIX PROGRAMMING **Course Code:** 22OE303

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

SECTION-A

AnswerALLquestions **(5×4=20Marks)**

1.(a) What is Shell? Explain the Types of Shells. (CO1,L1)

(Or)

(b) State I/O re-direction with examples. (CO1,L1)

2.(a) Write File Permission commands with examples. (CO2,L1)

(Or)

(b) Write short notes on Command Substitution with example. (CO2,L1)

3.(a) Write short note on Filters in UNIX with examples. (CO3,L1)

(Or)

(b) State merits of AWK Scripting. (CO3,L1)

4. (a) Write short note on significance of Regular Expression with grep command. (CO4,L1)

(Or)

(b) Write short note on significance of exit status in Shell Programming. (CO4,L1)

5. (a) Distinguish between Internal and External commands. (CO5,L4)

(Or)

(b) Examine process of debugging a Shell Script. (CO5,L4)

SECTION-B

Answer Five Questions Choosing One Question from each unit.

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

6.(a) Explain the concepts of Unix File System with neat diagram. (CO1,L2)

(Or)

(b) Explain the chmod and chown and chgrp commands with examples. (CO1,L2)

7. (a) Make use of Loop Control in Shell Programming with example (CO2, L3)

(Or)

(b) Make use of Shell Script that Backup Files in Directory to another Directory. (CO2,L3)

8. (a) Distinguish between sed and AWK. (CO3,L4)

(b) Examine grep command with examples. (CO3,L4)

(Or)

(c) Test for awk script to process a text file with different delimiters. (CO3,L4)

9. (a) Explain Branch Control and Loop Control Statements in Unix Shell Programming. (CO4,L2) (Or)

(b) Explain the usage of following command with examples. (CO2,L2)

(i). eval (ii) exec (iii) set (iv) exit (v) expr

10. (a) Explain the types of process in Unix environment with examples. (CO5,L5)

(Or)

(b) Explain the creation process in Unix environment and its significance. (CO5,L5)

(c) Explain the usage of following command with examples. (CO5,L5)

(i) trap (ii) kill (iii) stty

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

23OE304 – OFFICE TOOLS

Course Name	OFFICE TOOLS			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22OE304			3	0	0	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil							
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks										

Course Descriptive and Purpose:
The primary objective of these courses is to help learners understand the fundamental principles and concepts of office tools. Upon completion of the course, learners will be able to use office tools effectively for their work. They will also be able to develop professional documents, spread sheets, and presentationsusing the Microsoft suite of office tools.

Course Objectives:
This course will help enable the students t o understand, learn fundamental principles MS Word, How to use MS Power Point, Skills required to develop professional Spread Sheets, Gain knowledge on Charts and Macros and to generate Forms and Reports.

Specificobjectivesinclude:
- To provide an understanding of the fundamental principles MS Word.
- To teach learners how to use MS Power Point.
- To equip learners with the skills required to develop professional Spread Sheets.
- To gain knowledge on Charts and Macros.
- To generate Forms and Reports

Course Learning Outcomes:
Upon successful completion:

CO1 The course on word processing equips students with the skills to efficiently create, edit, format, and manage documents using word processing software, enabling them to enhance their productivity and professionalism in various personal, academic, and professional applications.

CO2 This course in MS PowerPoint empowers students to proficiently create and edit dynamic presentations, incorporating tables, objects, charts, and templates, while mastering the art of delivering engaging and impactful slide shows for a variety of communication needs.

CO3 The course in MS Excel imparts essential skills for efficiently utilizing Excel's features and functions, enabling students to proficiently manage data, create and edit formulas, format cells, and effectively utilizes printing options for a wide range of spread sheet applications.

CO4 This course in MS Access equips students with the knowledge and skills to effectively create and manage simple databases and tables, harnessing the features and components of Microsoft Access for practical data organization and retrieval.

CO5 The course in MS Access provides students with comprehensive proficiency in database creation, table management, form design, data querying, and report generation, enabling them to effectively utilize MS Access for data organization and presentation in a professional context**.**

SYLLABUS

Unit	Learning Units	Lecture Hours
I	**MS Word:** Word Processing-Features-Advantages and Applications-Parts of Word Window-Toolbar, Creating, Saving, Closing, Opening and Editing of a Document-Moving and Coping a Text, Formatting of Text and Paragraph-Bullets and Numbering-Find and Replace-Insertion of Objects, Headers and Footers-Page Formatting-Auto Correct-Spelling and Grammar-Mail Merge-Macros.	12
II	**MS Power Point:** Introduction - Starting-Parts-Creating of Tables-Create Presentation-Templates-Auto Content Wizard-Slide Show-Editing Of Presentation-Inserting Objects and Charts.	12
III	**MS Excel:** Features of MS Excel, Parts of MS Excel Window, Entering and Editing Data in Worksheet, Number Formatting in Excel, Different Cell References, How to enter and edit Formula in Excel, Auto Fill and Custom Fill, Printing Options. **Formatting Options:** Different Formatting Options, Change Row Height, Formulae and Functions. **Functions:** Meaning and Advantages of Functions, Different types of Functions available in Excel.	12
IV	**Charts:** Different Types of Charts, Parts of Chart, Chart Creation using Wizard, Chart Operations, Data Maps, Graphs, Data Sorting, Filtering, Excel Sub Totals, Scenarios, What-If Analysis. **Macro:** Meaning and Advantages of Macros, Creation, Editing and Deletion of Macros, Creating a Macro, How to run, How to delete a macro.	12
V	**MS Access:** Creating a Simple Database and Tables: Features of MS-Access, Creating a Database, Parts of Access. **Tables:** Table Creation using Design View, Table Wizard, Data Sheet View, Import Table, Link Table. **Forms:** The Form Wizard, Design View, Columnar, Tabular, Data Sheet, Chart Wizard. **Finding, Sorting and Displaying Data:** Queries and Dynasts, Creating and using Select Queries, Returning to the Query Design, Multi-level Sorts, Finding incomplete Matches, Showing All Records after a Query, Saving Queries - Crosstab Queries. **Printing Reports:** Form and DatabasePrinting.	12

Reference Text Book

	Author	Title	Publisher
1	Ron Mansfield	Working in Microsoft Office	Tata McGraw Hill, 2008
2	Ed Bott, Woody Leonhard	Using Microsoft Office 2007	Pearson Education, 2007
3	Sanjay Saxena	Microsoft Office	TMH BPB Publications

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 Name: OFFICE TOOLS **Course Code:** 22OE304

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

SECTION-A

Answer ALL questions **(5×4=20 Marks)**

1. (a) Explain features of *Word Processing*(CO1, L2)
   (Or)
   (b) Explain parts of *Word Window & ToolbarinWord Processing* (CO1, L2)
2. (a) What is *Creating of Tables*? Explain with example (CO2, L1)
   (Or)
   (b) List out and explain*Templates*? (CO2, L1)
3. (a) What is *Auto Fill* and *Custom Fill* in MS Excel? (CO3, L1)
   (Or)
   (b) List out *Parts of MS Excel Window*? (CO3, L1)
4. (a) Explain *Chart Creation* using *Wizard* (CO4, L2)
   (Or)
   (b) Explain *Editing* and *Deletion* of Macros? (CO4, L2)
5. (a) Explain *Features of MS-Access*? (CO5, L2)
   (Or)
   (b) Explain *Multi-level Sorts* in *Forms* (CO5, L2)

SECTION-B

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

6. (a) Explain *Creating, Saving, Closing, Opening and Editing* of a Document. (CO1, L2)
   (Or)
   (b) Explain *Mail Merge, Macros*with example. (CO1, L2)
7. (a) Apply *Editing of Presentation, Inserting Objects* and *Charts*with examples. (CO2, L3)
   (Or)
   (b) Build *Auto Content Wizard* and *Slide Show* with examples. (CO2, L3)
8. (a) What are *Number Formatting in Excel*? How to enter and edit *Formula* in Excel? (CO3, L1)
   (Or)
   (b) What is *Formatting Option*? Explain different types of*Functions* available in Excel. (CO3, L1)
9. (a) Explain *Filtering, Excel Sub Totals* and *Scenarios* in Charts. (CO4, L2)
   (Or)
   (b) Explain Different *Types of Charts* and *Operations* with examples. (CO4, L2)
10. (a) Explain process of *Creating a Database* and *Insert, Delete and Update of Records in a Table* usingMS Access. (CO5, L5)
    (Or)
    (b) Explain process of *showing all Records after a Query, Saving Queries, Crosstab Queries* withexamples. (CO5, L5)

Adusumilli Gopalakrishnaiah& Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

23OE305 – PYTHON PROGRAMMING

Course Name	PYTHON PROGRAMMING		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22OE305		3	0	0	3	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

CourseDescriptionandPurpose:
Python Programming is a course that illustrates basic concepts of Python programming, Decision Control Statements, Functions and Modules, Python Strings Revisited, DataStructures, Classes and Objects, Inheritance, and Operator Overloading.

Course Objectives:
Thiscoursewillhelp enable the students t o understand, learn and develop a various Decision Control Statements, Functions & Modules, Strings, Data Structures, Classes and Objects, Inheritance, and Operator Overloading.

Specificobjectivesinclude:
- To understand basics of *Python Programming*.
- To gain knowledge on *Decision Control Statements* and *Functions & Modules.*
- To gain knowledge on *Python Strings* and *Data Structures*.
- To gain knowledge on *Classes & Objects.*
- To apply Inheritance, *Operator overloading* and *Error and Exception Handling.*

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

CO1 Have a foundational understanding of Python programming, including its features, historical context, and prospects, and will be able to write and execute basic Python programs, work with literal constants, variables, data types, input operations, comments, reserved words, indentation, operators, and expressions, including operations on strings and other data types, along with type conversion.

CO2 Proficiency in using decision control statements, including conditional branching, loop structures, nested loops, and related control statements like break, continue, pass, and the integration of the else statement with loops in Python for effective program control flow.

CO3 Possess a comprehensive understanding of Python string manipulation, including concatenation, formatting, and regular expressions, as well as proficiency in working with various data structures such as sequences (lists, tuples), sets, dictionaries, and functional programming concepts in Python, enabling them to manipulate data effectively in Python programs.

CO4 Have solid grasp of object-oriented programming concepts in Python, including classes, objects, class methods, instance variables, private data members, and the use of built-in class attributes, enabling them to design and work with Python classes effectively.

CO5 Understand the concepts of inheritance in Python, including various types of inheritance, abstract classes, and interfaces. Additionally, they will be proficient in error and exception handling, encompassing the identification and management of exceptions, both built-in and user defined. Furthermore, students will have the capability to implement operator overloading in Python, recognizing its advantages and practical applications.

SYLLABUS

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.	12
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.	12
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.	12
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.	12
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.	12

Reference Textbook

	Author	Title	Publisher
1	Reema Thareja	Python Programming Using Problem Solving Approach	Oxford University Press, June 2017
2	Vamsi Kurama	Python Programming	A Modern Approach, Pearson, 2017
3	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) Programme - III Semester

Course Name: Python Programming **Course Code:** 22OE305

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

SECTION-A

AnswerALLquestions **(5×4=20Marks)**

1. (a)Explain *Future of Python*. (CO1, L2)

(or)

(b) Explain different *Data Types* in *Python.* (CO1,L2)

2. (a) What is *Recursive Function*? Explain with *example*. (CO2, L1)

(or)

(b) What are *break* and *continue*statements? (CO2, L1)

3. (a) What is *Appending* and*multiplying Strings*? (CO3,L1)

(or)

(b) Write in short about *Dictionaries.* (CO3, L1)

4. (a) What is *class method* and *self-argument*? (CO4,L2)

(or)

(b) Differentiate *Class Variables* and *static variables*. (CO4, L2)

5. (a) Explain *Advantages of Operator Overloading.* (CO5,L2)

(or)

(b) What is *Exception Handling?*(CO5,L2)

SECTION-B

AnswerFiveQuestionsChoosingOneQuestionfromEachUnit.
AllQuestionsCarryEqualMarks. **(5×10=50Marks)**

6. (a)Explainthe*featuresofPythonProgrammingLanguage.* (CO1, L2)

(or)

(b) Explain various *Operators* in Python with examples. (CO1, L2)

7. (a) Apply*Different Loops*inPython with example. (CO2.L3)

(or)

(b) Apply *Modules Concept* in Python with examples.(CO2, L3)

8. (a) Explain *Built in String methods* with examples. (CO3, L1)

(or)

(b) Build the *ListDataStructure* and their built in functionswithexamples. (CO3,L1)

9. (a) What are C*lasses* and *Objects*? Illustrate classes and objects in python. (CO4, L2)

(or)

(b) Explain *Class Methods* and *Static Methods* with examples.(CO4,L2)

10. (a) Explain different *Types of Inheritance* with an example.(CO5,L5)

(or)

(b) Explain how to Implement *Operator Overloading* in Python.(CO5,L5)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1T1: PROGRAMMING AND PROBLEM-SOLVING USING PYTHON

CourseName	Programming and Problem-solving using Python	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS1T1	4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil		**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks								

CourseDescriptionandPurpose:
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.

Specificobjectivesinclude:
- To understand basics of *Python Programming*.
- To gain knowledge on *Decision Control Statements* and *Functions & Modules and Python Strings* and *Data Structures*.
- To gain knowledge on *Classes & Objects, Inheritance.*
- To apply *Operator Overloading, Error and Exception Handling* and Pandas.
- To gain knowledge on File Handling, Database Connection, basics of NumPy and matplotlib.

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

CO1 UnderstandbasicsofPythonProgramming.
CO2 Gain knowledge on Decision Control Statements and Functions & Modules and Python Strings and Data Structures.
CO3 Gain knowledge on Classes & Objects & Inheritance.
CO4 Apply Operator Overloading, Error and Exception Handling and Pandas.
CO5 Gain Knowledge on File Handling, Database Connection, and basics of NumPy and matplotlib.

SYLLABUS

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 DataTypes,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.	12
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, Builtin String Methods and Functions, Comparing Strings, Regular Expressions. **Data Structures:** Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.	12
III	**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. **Inheritance:** Inheriting Classes in Python, Types of Inheritance, Abstract Classes, and Interfaces.	12
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.	12
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.	12

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

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

SECTION-A

Answer ALL questions **(5×4=20Marks)**

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=50Marks)**

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 instance variable.(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 Analysing 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)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1L1 – PROGRAMMING AND PROBLEM-SOLVING USING PYTHON LAB

CourseName	Programming and Problem-Solving using Python Lab	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
CourseCode	22CS1L1	0	0	6	3	30	70	100

Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil	**Percentage of Revision:** Nil

L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-InternalMarks, **SEE**-ExternalMarks, **TM**-TotalMarks

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:
CO1 Understand Basics of Python Programming, Decision Control Statements.
CO2 Know the concepts of Data Structures, Functions and Modules.
CO3 Know the concepts of Classes and Objects, Object Oriented Programming.
CO4 Apply Error and Exception Handling.
CO5 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 calculate area of triangle 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 to Rs.3,00, 000 then charge 10% tax. If taxable income is Rs.3,00,001 to Rs.5,00,000 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 equation.

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 grade 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 Armstrong 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, the program 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.

c) To calculate exp (x, y) using recursive functions d) To print the Fibonacci Series using Recursion.

24. Write a program make a Simple Calculator.

25. Write a program that defines a function large in a module which will be used to find large of two values and called from a code in another module.

26. Write a program that demonstrate the use of method init.

27. Write a program to illustrate the modification of instance variable.

28. Write a program for modifying a mutable type of attribute.

29. Write a program to demonstrate the use of inheritance.

30. Write a Program to demonstrate Polymorphism.

31. Write a program to demonstrate Polymorphism using Function Overloading.

32. Write Program to demonstrate Method Overriding with arguments.

33. Write a python program to demonstrate multilevel inheritance.

34. Write a program to demonstrate Multipath Inheritance (or) Hybrid Inheritance.

35. Write a program to demonstrate Multi Level Inheritance (A person is teacher & having designation HOD)

36. Write a program to demonstrate Multi-Path Inheritance.

37. Write a program to illustrate the concept of Abstract Class.

38. Write a program to overload the + operator on a complex object.

39. Write a program to handle Divide by Zero Exception.

40. Write a program to handle Multiple Errors with One Except statement.

41. Write a program with Multiple Except Blocks.

42. Write a program to demonstrate else statement in exception handling.

43. Write a python program to illustrate the try...catch...finally in exception handling.

44. Write a program to demonstrate Regular Expression Functions.
    - findall()
    - Search()
    - Split()
    - sub()

45. 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 |

46. 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 beginning 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 beginning 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 (Ch from a to Z, digits from 0-9, and the underscore _ 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".

47. 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.

48. Write a program to Create EMP table with attributes ENO, ENAME and ESAL into AGSGS database. Insert rows into EMP table of AGSGS database. Update rows of EMP table of AGSGS database. Delete rows from EMP table of AGSGS database.Drop EMP table of AGSGS database.

49. Write a program to open the file and count the number of times a character appears in the file.

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1T2: DATABASE MANAGEMENT SYSTEMS

Course Name	Database Management Systems		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22CS1T2		4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil			**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

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:
CO1 Understand basic concepts of Database and Database Users, Database Architecture.
CO2 Understand ER, EER Modeling and Relational Algebra and Relational Calculus.
CO3 Learn the basics of Functional Dependencies and Normalization for Relational Databases.
CO4 Learn Transaction Processing and Concurrency Control Techniques.
CO5 Understand the Structured Query Language and Emerging Database Technologies and Applications.

Syllabus

Unit	Learning Units	Lecture Hours
I	**Database and Database Users:** Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene,Advantages ofthe usingthe 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.	12
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: SELECTand PROJECT,Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus	12
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.	12
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 basedon Serializability. **Concurrency Control Techniques:** Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Mult version Concurrency control techniques, Validation Concurrency Control Techniques.	12
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.	12

Prescribed Textbook

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

SECTION-A

AnswerALLquestions. AllQuestionsCarryEqualMarks. (5×4=20Marks)

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 *PropertiesofTransaction.* (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

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

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);	-
X:=X-N;	-
-	read_item(X);

(or)

(b) Develop a technique for *Concurrency Control Based on Timestamp Ordering.* (BTL3)

10 (a) Analyse *Multimedia Databases* in detail. (BTL4)

(or)

(b) Distinguish various *Constraints* of SQL. (BTL4)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1L2 – DATABASE MANAGEMENT SYSTEM LAB

Course Name	Database Management Systems Lab	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22CS1T2	0	0	6	3	30	70	100

Year of Introduction: 1991	**Year of Offering:** 2023	**Year of Revision**: 2023	**Percentage of Revision:** 10

L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks

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 and Procedures 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:
- Database creation using DDL Commands.
- Retrieval of Data from database using DML Commands for a given situation.
- Use SQL commands familiarizing with a Query Language.
- Using Nested Queries, Joins, Integrity Constraints and Views in database.
- Demonstrating Triggers, Functions and Procedures using PL/SQL.

Course Outcomes:
At the end of this course the students should be able to:
CO1 Create database using DDL Commands.
CO2 Retrieve data from database using DML Commands for a given situation.
CO3 Familiarize with a Query Language through basic SQL Queries.
CO4 Experiment Nested Queries, Joins, Integrity Constraints and Views in database.
CO5 Demonstrate Triggers, Functions and Procedures using PL/SQL.

CYCLE-I

Aim: Marketing Company wishes to computerize their operations by using following tables.

TableName:Client-Master			
ColumnName	DataType	Size	Attribute
CLIENT_NO	Varchar2	6	Primary key and first letter must start with
NAME	Varchar2	20	Notnull
ADDRESS1	Varchar2	30	
ADDRESSS	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
AL_DUE	Number	10,2	

TableName:Product_Master			
ColumnName	DataType	Size	Attribute
PRODUCT_NO	Varchar2	6	Primary key and first letter must start with
DESCRIPTION	Varchar2	15	Notnull
PROFIT_PERCENT	Number	4,2	Notnull
UNIT_MEASUE	Varchar2	10	
QTY_ON_HAND	Number	8	
REORDER_LVL	Number	8	
SELL_PRICE	Number	8, 2	Not null,cannotbe0
COST_PRICE	Number	8,2	Not null,cannotbe0

TableName:Salesman_Master			
ColumnName	DataType	Size	Attribute
SALESMAN_NO	Varchar2	6	Primary key and first letter must start with‘S’
SALESMAN_NAME	Varchar2	20	Notnull
ADDRESS1	Varchar2	30	
ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	
STATE	Vachar2	20	
SAL_AMT	Number	8,2	Not null,cannotbe0
TGT_TO_GET	Number	6,2	Not null,cannotbe0
YTD_SALES	Number	6,2	Notnull
REMARKS	Varchar2	20	

TableName:Sales_Order			
ColumnName	*DataType*	*Size*	*Attribute*
ORDER_NO	*Varchar2*	*6*	*Primary key and first letter must start with ‘S’*
CLIENT_NO	*Varchar2*	*6*	*ForeignKey*
ORDER_DATE	*Date*		
DELY_ADDRESS	*Varchar2*	*25*	
SALESMAN_NO	*Varchar2*	*6*	*ForeignKey*
DELY_TYPE	*Char*	*1*	*Delivery:part(p)/full(f)anddefault‘F’*
BILL_YN	*Char*	*1*	
DELY_DATE	*Date*		*Can’tbe less than order date*
ORDER_STATUS	*Varchar2*	*10*	*Values(“InProcess”,“Fulfilled”,*

TableName:Sales_Order_Details			
ColumnName	DataType	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	ForeignKey

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 in‘Mumbai’ or ‘Bangalore’.
3. List the various products available from the product_master table.
4. Find the namesof salesman 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 value1000.
7. List the clients whostayina citywhose firstletteris‘M’.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling priceis 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 handis 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 clientnames 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 FIVE 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 greater than 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 IDs of suppliers who supply red or pink parts.
6. Find the names of parts supplied by the London supplier and by no one else.
7. Get the names of the parts supplied by the suppliers '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 "co-located."
10. Get supplier names for suppliers who supply at least one red part.

CYCLE-III

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

Emp (Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno)
Dept (Deptno, Dname, Loc)
Solve the following queries using the above tables:

1. List the details of employees who have joined before the end of September '81.
2. List the name 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% for those whose experience is greater than 12 years.
7. Determine the departments that do not contain any employees.
8. Create a view that contains employee names and their manager names working in the sales department.
9. Determine the employees whose total salary is equal to the minimum salary of any department.
10. List the department numbers and the number of employees in each department.
11. Determine the employees whose total salary is equal to the minimum salary of any department.
12. List the average salary for all departments employing more than five people.
13. Determine the names of employees who take the highest salary in their departments.
14. Determine the names of employees who earn more than their managers.
15. Display the department name and employee name, even if no employee belongs to that department (use outer join).

CYCLE-IV

An airline system would like to keep track of 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:

1. Find the names of pilots whose salary is less than the price of the cheapest route from New York to Chicago.
2. For each pilot who is certified for more than two aircraft, find the eid and the maximum cruising range of the aircraft that he or she is certified for.
3. For all aircraft with a cruising range over 1,500 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
4. Find the aid of all aircraft that can be used from Chicago to Los Angeles.
5. Find the names of the pilots certified for some Boeing aircraft.
6. Print the names of pilots who can operate planes with a cruising range greater than 3,500 miles but are not certified by Boeing aircraft.
7. Find the eid of employees who are certified for exactly two aircraft.

8. Find the total amount paid to employees as salaries.
9. Find the aid of all aircraft that can be used on non-stop flights from Chennai to Dubai.
10. Find the eid of employees who make the second highest salary.

PL/SQLPROGRAMS

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

Table used: Elect		
Name	Null?	Type
MNNO	NOTNULL	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	NOTNULL	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 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	NOTNULL	NUMBER
NAME		VARCHAR2 (10)
INTNO		NUMBER
CLASS	NOTNULL	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(INTEGERNUMBER)		NUMBER
TOT		NUMBER
GRADE		VARCHAR2(10)
PERCENT		NUMBER
DAT_ENTER		DATE

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1T3 – FORMAL LANGUAGES AND AUTOMATA THEORY

Course Name	Formal Languages and Automata Theory		**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22CS1T3		4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil			**Percentage of Revision:** Nil				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

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 analyse the dynamic behaviour 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 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 Objectives:
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 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.

Syllabus:

Unit	Learning Units	Lecture Hours
I	**Fundamentals**: Strings, alphabet, language, operations, finite automaton model, acceptance of strings and languages, transition table, and transition diagrams. **Finite Automata**: Deterministic finite automaton (DFA), nondeterministic finite automaton (NFA), and NFA with ε-transitions; significance; equivalence between NFA with and without ε-transitions; NFA to DFA conversion; minimization of finite state machines (FSM); equivalence between two FSMs; finite automata with output—Moore and Mealy machines.	12
II	**Regular Languages**: Regular sets, regular expressions, identity rules, construction of finite automata (DFA) for a given regular expression, and its inter conversion using state elimination and Arden's theorem; pumping lemma of regular sets; closure properties of regular sets (proofs not required)	12

III	**Context-Free Grammar**: Introduction, derivation trees, ambiguity in context-free grammars, minimization of context-free grammars, Chomsky normal form, and Greibach normal form. **Pushdown Automata:** Definition, model, design of pushdown automata (PDA), the language of PDA—acceptance by final state, acceptance by empty stack, equivalence of context-free languages (CFL) and PDA, conversion of CFL to PDA and PDA to CFL. **Turing Machine:** Definition, Turing machine model, types of Turing machines (problems not required), recursively enumerable languages and recursive languages, Chomsky hierarchy of languages, and the Post correspondence problem.	12
IV	**Compiler:** Introduction, structure of a compiler, design issues of compilers, phases of a compiler, lexical analysis, role of the lexical analyzer, input buffering, specification of tokens, and recognition**.**	12
V	**Lex (Lexical Analyzer Generator):** Uses of Lex, structure of Lex programs, conflict resolution in Lex, and the lookahead operator. **Syntax Analysis:** Top-down parsing, recursive descent parsing, FIRST and FOLLOW sets, LL(1) grammar, non-recursive predictive parsing, error recovery in predictive parsing. Bottom-up parsing—reductions, handle pruning, shift-reduce parsing, and conflicts during shift-reduce parsing.	12

Prescribed Text Book		
Author	Title	Publisher
Hopcroft. H.E. and Ullman	Introduction to Automata Theory Languages and Computation	J.D.Pearson Education, January 2008
Jeffery D.Ullman	Compilers -Principles, Techniques and Tools	2nd Edition, Pearson Education, January2013
John C Martin	Introduction to Languages and the Theory of Computation	Tata Mc Graw-Hill, 2003

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

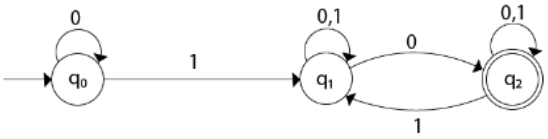
FORMALLANGUAGESANDAUTOMATATHEORY Code: 22CS1T3
Time 3 Hours Max.Marks: 70

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)
(b) Explain 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)

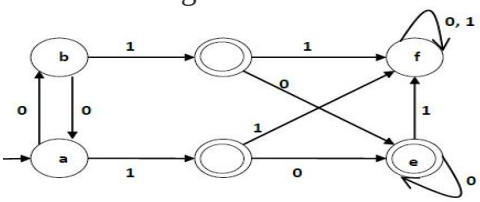
SECTION-B
Answer all questions. 5 × 10 = 50 Marks

6. (a) Construct the given NFA to DFA. (BTL3) 10 Marks

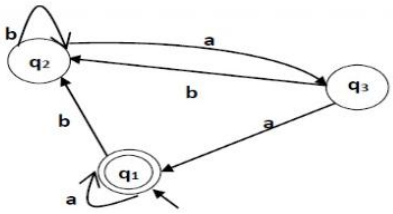


(OR)

(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 Hierarchyof 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)

Adusumilli Gopalakrishnaiah & Sugarcane Growers
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
Vuyyuru-521165, Krishna District, Andhra Pradesh
Sponsors: Siddhartha Academy of General & Technical Education, Vijayawada
An Autonomous college in the Jurisdiction of Krishna University
Accredited by NAAC "A" Grade * ISO 9001:2015 Certified Institution

22CS1T4 – OPERATING SYSTEMS

Course Name	Operating Systems			**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TM**
Course Code	22CS1T4			4	0	0	4	30	70	100
Year of Introduction: 2022	**Year of Offering:** 2024	**Year of Revision**: Nil		**Percentage of Revision:** Nil						
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks										

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 Process Concept.
- 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 Operating Systems.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:
CO1 Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.
CO2 Applying concepts of Threads, Process Synchronization & CUP Scheduling.
CO3 Understand Deadlock, Main Memory & Virtual Memory.
CO4 Explain Mass Storage Structure, File System Interface & File System Implementation.
CO5 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 systems, operating system structure, operating system operations, kernel data structures, and computing environment. **Operating System Structures**: Operating system services, system calls, and types of system calls. **Processes**: Process concept, process scheduling, operations on processes, inter-process communication, and communication in client-server systems.	12
II	**Threads:** Overview, multicore 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, and monitors. **CPU Scheduling**: Basic concepts, scheduling criteria, scheduling algorithms, thread scheduling, and multiple processor scheduling.	12
III	**Deadlocks**: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, and recovery from deadlock. **Main Memory**: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table, and Intel 32 and 64-bit architectures. **Virtual Memory**: Background, demand paging, copy-on-write, page replacement, allocation of frames, and thrashing.	12
IV	**File System Interface:** File concept, access methods, directory and disk structure, file system mounting, and protection. **File System Implementation**: File system structure, file system implementation, directory implementation, allocation methods, free space management, efficiency and performance, and recovery.	12
V	**Distributed Operating Systems**: Types of networks based on operating systems, network structure, network topology, communication structure, communication protocols, robustness, and design issues. **Mobile & Android Operating Systems**: A review of mobile operating systems and features of Android operating systems.	12

Prescribed Textbook

	Author	Title	Publisher
1	Abraham Silberschatz & Peter Baer 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
Time: 3 Hours **Max Marks: 70**

SECTION-A

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

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) Analyse Paging. (BTL4)

4 (a) Demonstrate the *File Concept* (BTL2)

(or)

(b) Explain various*FileOperations*.(BTL2)

5 (a) Construct a *Network Topology*. (BTL3)

(or)

(b) Identify the design issues in *Distributed OS*. (BTL3)

SECTION-B

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

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	BurstTime
P1	24
P2	3
P3	3

Process	BurstTime
P1	6
P2	8
P3	7
P4	3

(ii) Shortest-Job-First Scheduling with following data

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 amemory With three frames implement *Optimal Page Replacement* and *LRU Page Replacement*. (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)