PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Siddhartha Nagar, VIJAYAWADA - 520 010, Andhra Pradesh
Autonomous, NAAC A+ Grade, ISO Certified Institution
Since 1975

NAAC - SSR IV CYCLE

M.Sc. COMPUTATIONAL DATA SCIENCE

REGULATION 20

2021-22

PROGRAMME STRUCTURE &

SYLLABUS

TABLE 1: M.Sc.(COMPUTATIONAL DATA SCIENCE) Programme SEMESTER - I

S.NO	Name of the Course	Course Code	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Mathematical Essentials for Data Science	21DS1T1	Employability	100	30	70	4	4
2	Data Structures	21DS1T2	Employability	100	30	70	4	4
3	Object Oriented Programming	21DS1T3	Employability	100	30	70	4	4
4	Advanced Database Management Systems	21DS1T4	Skill	100	30	70	4	4
5	Data Mining	21DS1T5	Skill	100	30	70	4	4
6	Data Structures Lab	21DS1L1	Skill	100	30	70	4	4
7	Object Oriented Programming Lab	21DS1L2	Skill	100	30	70	4	4
8	Seminar	21DS1S1	Skill	50	50	Nil	2	1
		TOTAL(Maximum)		750	260	490	30	29

TABLE 2: M.Sc.(COMPUTATIONAL DATA SCIENCE) Programme SEMESTER - II

S.NO	Name of the Course	Course Code	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Essentials of Statistics for Data Science using	21DS2T1	Employablity	100	30	70	4	4
2	Machine Learning	21DS2T2	Employablity	100	30	70	4	4
3	Internet of Things	21DS2T3	Employablity	100	30	70	4	4
4	Design & Analysis of Algorithms	21DS2T4	Employablity	100	30	70	4	4
5	Web Technologies	21OE03	Skill	100	30	70	4	4
6	Machine Learning Lab	21DS2L1	Skill	100	30	70	3	3
7	Web Technologies Lab	21DS2L2	Skill	100	30	70	3	3
8	Technical Report Writing	21DS2TRW	Skill	50	50	Nil	2	1
		TOTAL(Maximum)		750	260	490	28	27

TABLE 3: M.Sc.(COMPUTER SCIENCE) Programme SEMESTER -III 2021-22

S.NO	Name of the Course	Course Code	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Cloud Computing	21DS3T1	Employablity	100	30	70	4	4
2	Cyber Security	21DS3T2	Employablity	100	30	70	4	4
3	Big Data and Analytics	21DS3T3	Skill	100	30	70	4	4
4	Deep Learning	21OE10	Employablity	100	30	70	4	4
	Social Media Analytics	21DS3T5	Skill	Nil	Nil	Nil	Nil	Nil
5	Block Chain Technology	21DS3T5i	Skill	100	30	70	4	4
6	Deep Learning Lab	21DS3L1	Skill	100	30	70	3	3
7	Big Data and Analytics Lab	21DS3L2	Skill	100	30	70	3	3
8	Mini Project	21DS3P1	Skill	50	50	Nil	Nil	1
	TOTAL(Maximum)			600	260	490	26	27

TABLE 4: M.Sc.(COMPUTATIONAL DATA SCIENCE) Programme SEMESTER -

S.NO	Name of the Course	Course Code	Type of the Paper	Total Marks	IA TEST	Sem End Exam	Teaching Hours	Credits
1	Privacy and Security in online Social Media(MOOCs)	21DS4M1	Skill	100	30	70	4	4
2	Data Visualization	21DS4T1	Skill	100	30	70	4	4
2	Natural Language Processing	22DS4E2	Employablity					
3	Business Analytics	22DS4E3	Employablity	100	30	70	4	4
4	Data Visualization Lab	22DS4E4	Employablity	100	30	70	3	3
5	Project Work	20DS4P1	Skill	200	100	100	nil	8
	TOTAL(Maximum)			600	220	380	15	23

21DS1L1
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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
DATA STRUCTURES LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** I
Prerequisites: Java Programming   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

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

Course Outcomes:
On successful completion of this course, the students able to:
CO1: Understand the concepts of *Stacks*, *Queues*, and *Tree Traversals*.
CO2: Apply the operations of *Singly Linked Lists*, *Doubly Linked Lists*, *Circular Linked Lists* and *Operations on Stacks and Queues*.
CO3: Apply operations on *Binary Search Tree*, *Binary Search Tree Traversals*, *Sparse Matrix and DFS* & *BFS Algorithm*.
CO4: Implement *Searching & Sorting Algorithms*.
CO5: Implement *AVL-Trees* and *B-Trees*.

CYCLE 1 (BTL1)
1. Write a Java Program to create a class called Stack and implement Stack Operations.
2. Write a Java Program to create a class called Queue and implement Stack Operations.
3. Write a Java Program to convert the Infix to Postfix Expression.
4. Write a Java Program to evaluate Postfix Expression.
5. Write a Java Program to obtain the Binary Number for a given Decimal Number.

CYCLE 2 (BTL1)
1. Write a Java Class to implement the operations of a Singly Linked List.
2. Write a Java Class to implement the operations of a Doubly Linked List.
3. Write a Java Class to implement the operations of a Circular Linked List.
4. Write a java program for the following a) Reverse a Linked List b) Sort the data in a Linked List
   c) Remove Duplicates d) Merge Two Linked Lists
5. Write a java program for performing various operations on Stack using Linked List.
6. Write a java program for performing various operations on Queue using Linked List.

CYCLE 3 (BTL1)
1. Write a Java Program to implement operations on Binary Trees Using Recursive and Non-
    Recursive Methods.
2. Write a Java Program to perform Binary Search Tree Traversal.

3. Write a Java Program to implement Sparse Matrix.
4. Write a Java Program to implement DFS Algorithm.
5. Write a Java Program to implement BFS Algorithm.

CYCLE 4 (BTL1)

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

CYCLE 5 (BTL1)

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

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
OBJECT ORIENTED PROGRAMMING LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** I
Prerequisites: Programming Fundamentals   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand *Basics of Python Programming*, *Decision Control Statements*.
2. To know the concepts *of Data Structures*, *Functions and Modules*.
3. To know the concepts of *Classes and Objects*, *Object Oriented Programming*.
4. To apply *Error and Exception Handling*.
5. To implement *Database Access* and *File Handling*.

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

1. Write a program to find total for given number of tens, number of fives, number of twos and number of ones. (BTL1)

2. Write a program to enter a number and display its hex and octal equivalent and its square root. (BTL1)

3. Write a program to read and print values of variables of different data types. (BTL1)

4. Write a program to calculate the distance between two points. (BTL1)

5. Write a program to calcuate area of troangle using Heron's formula. (BTL1)
    (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. (BTL1)

7. Write a program to perform addition, subtraction, multiplication, division, integer division. (BTL1)

8. Write a program to find the greatest number from three numbers. (BTL1)

9. Write a program to calculate tax given the following conditions: (BTL1)
    If income is less than 1,50, 000 then no tax
    If taxable income is Rs.1,50,001 - Rs.300,000 then charge 10% tax
    If taxable income is Rs.3,00,001 - Rs.500,000 then charge 20% tax
    If taxable income is above Rs.5,00,001 then charge 30% tax

10. Write a program to calculate roots of quadratic equation. (BTL1)

11. Write a program to enter the marks of a student in four subjects. Then calculate the total and aggregate, and display the grade obtained by the student. If the student scores an aggregate garter than 75%, then the grade is Distinction. If aggregate is 60>= and <75, then grade is First Division. If the aggregate is 50>= and <60, then the grade is Second Division. If aggregate is 40>= and <50, then the garde is Third Division. Else the grade is Fail. (BTL1)

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. (BTL1)

13. Write a program to find whether the given number is an *Amstrong Number* or *not*. (BTL1)

14. Write a program to enter a Decimal Number. Calculate and display its Binary Equivalent. (BTL1)

15. Write a program to demonstrate List Operations. (BTL2)

- 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. (BTL2)

- 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. (BTL1)

- 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. (BTL1)

- 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*.(BTL1)

20. Write a program to print the *Reverse Number*. (BTL1)

21. Write a program to calculate GCD of two numbers. (BTL1)

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. (BTL1)

23. Write a program (BTL1)

(a) To calculate the factorial of number recursively.

(b) To calculate GCD using the recursive functions.

24. Write a program (BTL1)

(a)To calculate exp(x,y) using recursive functions

(b) To print the Fibonacci Series using Recursion.

25. Write a program make a *Simple Calculator*. (BTL1)

26. 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. (BTL1)

27. Write a program that demonstrate the use of method __init__ . (BTL1)

28. Write a program to illustrate the modification of instance variable. (BTL1)

29. Write a program for modifying a mutable type attribute. (BTL1)

30. Write a program to demonstrate the use of inheritance. (BTL1)

31. Write a Program to demonstrate Polymorphism. (BTL1)

32. Write a program to demonstrate Polymorphism using Function Overloading. (BTL2)

33. Write Program to demonstrate Method Overriding with arguments. (BTL2)

34. Write a python program to demonstrate multilevel inheritance. (BTL2)

35. Write a program to demonstrate Multipath Inheritance (or) Hybrid Inheritance. (BTL2)

36. Write a program to demonstrate Multi Level Inheritance (A person is teacher & having designation HOD) (BTL2)

37. Write a program to demonstrate *Multi-Path Inheritance*.(BTL2)

38. Write a program to illustrate the concept of Abstract Class. (BTL2)

39. Write a program to overload the + operator on a complex object. (BTL1)

40. Write a program to handle Divide by Zero Exception. (BTL2)

41. Write a program to handle Multiple Errors with One Except statement. (BTL2)

42. Write a program with Multiple Except Blocks. (BTL2)

43. Write a program to demonstrate else statement in exception handling. (BTL2)

44. Write a python program to illustrate the try...catch...finally in exception handling. (BTL2)

45. Write a program to demonstrate Regular Expression Functions. (BTL2)

- findall()

- Search

- Split

- sub()

46. Write a program Demonstrate Regular Expression Meta Characters. (BTL2)

- Python program to match string using metacharacter []
- Program to find digits in character using metacharacter \
- Program for sequence that starts with "he", followed by two (any) characters using metacharacter ..
- Program to check if the string starts with 'hello' using metacharacter ^
- Program to check the string ends with 'world' using metacharacter $
- Program to check the string contains "ai" followed by 0 or more "x" characters
- Program to check the string contains "ai" followed by 1 or more "x" characters
- Program to check if the string contains "a" followed by exactly two "l" characters
- Program to check if the string contains either "falls" or "stays" using meta character |

47. Write a program to demonstrate Regular Expression Sequences. (BTL2)

- Program to check if the string starts with "The"
- Program to check if "ain" is present at the begining of a word
- Program to check if "ain" is present at the end of a word.
- Program to check if "ain" is present, but NOT at the begining of a word.
- Program to check if "ain" is present, but NOT at the end of a word.
- Program to Check if the string contains any digits (numbers from 0-9).
- Program to return a match at every no-digit character.
- Program to return a match at every white-space character.
- Program to return a match at every NON white-space character.
- Program to return a match at every word character (characters from a to Z, digits from 0-9, and 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".

48. Write a program to demonstrate Regular Expression Sets. (BTL2)

- Program Check if the string has any a, r, or n characters.
- Program to Check if the string has any characters between a and n.
- Program to Check if the string has other characters than a, r, or n.
- Program to check if the string has any 0, 1, 2, or 3 digits.
- Program to check if a string has any digits.
- Program to check if the string has any two-digit numbers, from 00 to 59.

- Program to Check if the string has any characters from a to z lower case, and A to Z upper case.
- Program to check if the string has any + characters.

49. Write a program to (BTL3)

- Create EMP table with attributes ENO,ENAME and ESAL into PBS database.
- Insert rows into EMP table of PBS database.
- Update rows of EMP table of PBS database.
- Delete rows from EMP table of PBS database.
- Drop EMP table of PBS database.

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

    (BTL1)

COURSE	COURSE CODE	L	T	P	C	Year
SEMINARS	21DS1S1	4	-	-	4	2020-21

Course Outcomes

CO1: Recall and define key concepts related to the presented computer technologies.(PO1)(PO5)(PO7)

CO2: Explain the fundamental principles and functionalities of the technologies covered in the seminars.(PO1)(PO5)

CO3: identify and analyze real-world applications of the presented technologies in various industries.(PO3)

CO4: Compare and evaluate different approaches or solutions within a chosen technology, considering their strengths and weaknesses,(PO4)(PO6)

CO6: Develop a concise presentation or written report on a chosen technology(PO3)

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
21DS1S1	CO1	M				H		M
	CO2	H				H		
	CO3	H		H		L		
	CO4			H				
	CO5							H

Seminars are focused learning sessions designed for students to delve deeper into specific computer technologies. They offer a platform to:

- Explore emerging trends:.
- Gain in-depth knowledge:
- Develop presentation skills:.
- Network with professionals:

Overall, seminars bridge the gap between theoretical knowledge and practical applications in the ever-evolving field of computer science.

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MATHEMATICAL ESSENTIALS FOR DATA SCIENCE
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** I
Prerequisites: Fundamentals of Algebra, Calculus   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand *Matrices*, *Vectors*, *Determinants*, *Linear Systems of Equations.*
2. To solve *Matrix Eigenvalue Problems* and understand *Symmetric Metrices and Quadratic Forms*.
3. To understand *Vector Differential Calculus*.
4. To know and apply *Vector Integral Calculus*.
5. To familiar with *Optimization*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand *Matrices*, *Vectors*, *Determinants*, *Linear Systems of Equations.*
CO2: Solve *Matrix Eigenvalue Problems* and understand *Symmetric Metrices and Quadratic Forms*.
CO3: Understand *Vector Differential Calculus.*
CO4: Know and apply *Vector Integral Calculus*.
CO5: Familiar with *Optimization*.

NOTE: For Theorems only Statements are to be specified, Proofs are not needed.

UNIT I
Matrices, Vectors, Determinants, Linear Systems of Equations: Basic Concepts (Matrix Addition, Scalar Multiplication) - Matrix Multiplication - Linear Systems of Equations - Gauss Elimination - Rank of a Matrix - Linear Independence - Vector Space - Solutions of Linear Systems - Existence - Uniqueness - Determinants - Cramer's Rule - Inverse of a Matrix - Gauss Jordan Elimination - Vector Spaces - Inner Product Spaces - Linear Transformations.
Prescribed Book (1)

UNIT II
Matrix Eigenvalue Problems: Eigenvalues and Eigenvectors - Some Applications of Eigenvalue Problems - Symmetric, Skew Symmetric, and Orthogonal Matrices - Complex Matrices (Hermitian, Skew Hermitian, Unitary) - Similarity of Matrices - Basis of Eigenvectors (Only Statement, Proof not included) - Diagonalization.
Prescribed Book (1)
Symmetric Metrices and Quadratic Forms: Diagonalization of Symmetric Matrices - Quadritic Forms - Constrained Optimization - The Singular Value Decomposition - Applications to Image Processing.
Prescribed Book (2)

UNIT III
Vector Differential Calculus: Vector Algebra in 2-Space and 3-Space - Inner Product (Dot Product) - Vector Product (Cross Product) - Vector and Scalar Functions and Fields - Derivatives - Curvature and

Torsion of a Curve - Gradient of a Scalar Field - Directional Derivative - Divergence of a Vector Field - Curl of a Vector Field.
Prescribed Book (1)

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UNIT IV
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Vector Integral Calculus : Line Integrals - Independent Path - Double Integrals - Green's Theorem in the Plane (Only Statement, Proof not included) - Surfaces for Surface Integrals - Surface Integrals - Triple Integrals - Divergence Theorem of Gauss (only Statement, proof not included) - Applications of the Divergence Theorem - Stokes's Theorem (Only Statement, proof not included).
Prescribed Book (1)

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UNIT V
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Optimization: Introduction to Optimization - Classification of Optimization Problems - Linear vs. Nonlinear Programming Problems - Unconstrained Minimization Problems - Gradient Based Methods (Steepest Decent (Cauchy) Method, Newton's Method - Introduction to Derivative Free Optimization - Derivative Based vs Derivative Free Optimization.
Prescribed Book (3)

Prescribed Text Books			
	Authors	Title	Publisher
1	Erwin Kreyszig	Advanced Engineering Mathematics	Jhon Wieley & Sons. Inc., Eighth edition, 2002
2	David C. Lay	Linear Algebra and its Applications	Pearson, Third Edition, 2003
3	Anuradha Srinivasaraghavan, Vincy Joseph	Machine Learning	Wiley, First Edition, 2019

Reference Text Books			
	Authors	Title	Publisher
1	R.K. Jain, S.R.K. Iyengar	Advanced Engineering Mathematics	Alpha Science, Third Edition
2	Gilbert Strang	Linear Algebra and Its Applications	Cengage Learning, Fourth Edition, 2006

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M.Sc.(DATA SCIENCE) DEGREE EXAMINATIONS

FIRST SEMESTER

MATHEMATICAL ESSENTIALS FOR DATA SCIENCE

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

Answer all questions. All question carry equal marks.   **5 × 14 Marks**

UNIT I

1.Solve the following system of equations using Cramer's rule.   (CO1,BTL4)

$$x+2y+3z = 20$$

$$7x+3y+z = 13$$

$$x +6y+2z = 0$$

(OR)

2. Find the inverse of the matrix $A = \begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix}$ using Gauss Jordan Elimination

method.   (CO1,BTL4)

UNIT II

3. Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ (CO2,BTL4)

(OR)

4. Orthogonally diagonalize the matrix $A = \begin{bmatrix} 3 & -2 & 4 \\ -2 & 6 & 2 \\ 4 & 2 & 3 \end{bmatrix}$ (CO2,BTL5)

UNIT III

5. a) Let v = [yz, 3zx, z]. Find Curl v and Div v   (CO3,BTL3)

   b) Let f = $Cos^2 x + Sin^2 y$. Calculate $\nabla^2 f$ (CO3,BTL3)

(OR)

6. Let a = [4,7,0], b =[3,-1,5], c =[-6,2,0] and d=[-1, 2, 8]

   Calculate the following expressions

   (i)   5(axb).c & 5(a.b)xc

   (ii)   ax6(bxd) & $|a + b|$

   (iii)   (a b d)   (CO3,BTL3)

UNIT IV

7. Let F = $[x^2e^y, y^2e^x]$ and R be the rectangle with vertices (0,0), (2,0)(2,3)(0,3).
   Evaluate the line Integral $\int F(r). dr$ along the R using Greens theorem. (CO4,BTL5)

(OR)

8. Evaluate $\iint (7xi - zk). n \, dA$ over the sphere S: $x^2+y^2+z^2 = 4$ (CO4,BTL5)

UNIT V

9. Minimize $f(x_1, x_2) = 2x_1 - 2x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $x_1 = (0, 0)$.
   (CO5,BTL5)

(OR)

10. What is Steepest Descent Method? Explain with an example. (CO5,BTL3)

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21DS1T2
P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
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DATA STRUCTURES
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** I
Prerequisites: C Programming   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To learn overview and Preliminaries of Data Structure.
2. To understand the concepts of String Processing, Arrays, Records and Pointers.
3. To understand and implement Linked Lists, Stacks, Queues and Recursion.
4. To analyze and implement Tree Concepts.
5. To understand and implement Graphs, Sorting and Searching.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Learn overview and Preliminaries of Data Structure.
CO2: Understand the concepts of String Processing, Arrays, Records and Pointers.
CO3: Understand and implement Linked Lists, Stacks, Queues and Recursion.
CO4: Analyze and implement Tree Concepts.
CO5: Understand and implement Graphs, Sorting and Searching.

UNIT I
Introduction and Overview: Elementary Data Organization - Data Structures - Data Structure Operations - Algorithms: Complexity - Time Space Tradeoff.
Preliminaries: Mathematical Notation and Functions - Algorithmic Notation - Control Structures - Complexity of Algorithms - Other Asymptotic Notations - Sub Algorithms - Variables - Data Types.

UNIT II
String Processing: Storing Strings - Character Data Type - String Operations - Word Processing - Pattern Matching Algorithms.
Arrays, Records and Pointers: Linear Arrays - Representation and Traversing Linear Arrays - Inserting and Deleting - Bubble Sort - Linear Search - Binary Search - Multidimensional Arrays - Pointer Arrays - Record Structures - Representation of Records in Memory - Parallel Arrays -Matrices - Sparse Matrices.

UNIT III
Linked Lists: Representation **-** Traversing **-** Searching **-** Memory Allocation: Garbage Collection, Insertion, Deletion, Header Linked Lists, Two Way Lists.
Stacks, Queues, Recursion: Stacks **-** Array Representation **-** Linked List Representation **-** Arithmetic Expressions: Polish Notation, Quick Sort, Recursion, Towers of Hanoi, Implementation of recursive procedures by stacks, Queues, Linked representation of Queues, DEqueues, Priority Queues.

UNIT IV
Trees: Binary Trees - Representing and Traversing Binary Trees - Traversal Algorithms Using Stacks **-** Header Nodes **-** Binary Search Trees **-** Searching **-** Insertion and Deletion in Binary Search Trees **-** AVL Search Trees - Insertion and Deletion in AVL Trees **-** M Way Search Trees **-** Searching **-** Insertion and Deletion in M Way Search Tree **-** B Trees **-** Searching - Insertion and Deletion in B Tree - Heap: Heap Sort - Huffman's Algorithms - General Trees.

UNIT V
Graphs: Terminology - Sequential representation of Graphs - Warshall's Algorithm - Linked Representation of Graphs - Operations on Graphs - Traversing a Graph - Topological Sorting.
Sorting and Searching: Insertion Sort - Selection Sort - Merging - Merge Sort - Radix Sort - Searching and Data Modification - Hashing.

Prescribed Text Book			
S.No.	Author	Title	Publisher
1	Seymour Lipschutz	Data Structures	The McGrawHill (Schaum's Outlines), 2011

Reference Text Book			
S.No.	Author	Title	Publisher
1	Seymour Lipschutz	Theory and Problems of Data Structures	The McGrawHill (Schaum's Outlines)
2	Aho, Hopcroft & Ullman	Data Structures & Algorithms	Addison-Wesley
3	M.A.Weiss	Data Structures & Algorithms in C	Addison Wesley

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010

(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)

M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
FIRST SEMESTER
DATA STRUCTURES
SYLLABUS W.E.F 2021-2022

Time 3 Hours   **Max.Marks: 70**
Answer all questions. All question carry equal marks.   **5 × 14 Marks**

UNIT I

1.   a) Discuss *Elementary Data Organization* and *Data Structure Operations.* (BTL6)   14 Marks
(or)
b) Discuss various *Control Structures*. (BTL6) 14 Marks

UNIT II

2.   a) Explain *Binary Search Algorithm* and *Linear Search Algorithm* with an example. (BTL2) 14 Marks
(or)
b) Explain *The Second Pattern Matching Algorithm* with example. (BTL2) 14 Marks

UNIT III

3. a) Explain *Quick Sort & Merge Sort Algorithm* with example.(BTL2) 14 Marks
(or)
  b) Explain *Operations of Stack* and its representation using *Linked List* and
     Array with example. (BTL2) 14 Marks

UNIT IV

4.   a) Discuss *Binary Tree Traversal Techniques* using *Stack* in detail. (BTL6) 14 Marks
(or)
  b) Briefly discuss about the insertion and deletion operations of Binary Search Trees
     with example. (BTL6) 14 Marks

UNIT V

5.   a) Explain the process of *Topological Sorting*. (BTL5) 14 Marks
(or)
  b) Explain various *Hashing Techniques* with examples. (BTL5) 14 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
OBJECT ORIENTED PROGRAMMING
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** I
Prerequisites: Programming Fundamentals   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand basics of *Python Programming*.
2. To gain knowledge on *Decision Control Statements* and *Functions & Modules*.
3. To familiar with *Python Strings* and *Data Structures*.
4. To gain knowledge on *Classes & Objects.*
5. To apply *Inheritance*, *Error and Exception Handling* and *Operator Overloading*.

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

UNIT I
Basics of Python Programming: Features of Python - History of Python - The Future of Python - Writing and Executing First Python Program - Literal Constants - Variables and Identifiers - Data Types - Input Operation - Comments - Reserved Words - Indentation - Operators and Expressions - Expressions in Python - Operations on Strings - Other Data Types - Type Conversion.
Decision Control Statements: Conditional Branching Statements - Basic Loop Structures - Nested Loops - The Break Statement - The Continue Statement - The Pass Statement - The Else Statement used with Loops.

UNIT II
Functions and Modules: Function Definition **-** Function Call **-** Variable Scope and Lifetime **-** The Return Statement - More on Defining Functions **-** Recursive Functions **-** Modules **-** Packages in Python - Standard Library Modules.
Python Strings Revisited: Concatenating **-** Appending and Multiplying Strings **-** String Formatting Operator **-** Built in String Methods and Functions **-** Comparing Strings **-** Regular Expressions.
Data Structures: Sequence - Lists - Functional Programming - Tuple - Sets - Dictionaries.

UNIT 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.

UNIT 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.

UNIT 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.

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

Reference Text Book			
	Author	Title	Publisher
1	Wesley Chun	Core Python Programming	Prentice Hall
2	Vamsi Kurama	Python Programming - A Modern Approach	Pearson, 2017

e-resources: https://www.w3schools.com/python/pandas/

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010

(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)

M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS

FIRST SEMESTER

OBJECT ORIENTED PROGRAMMING

SYLLABUS W.E.F 2021-2022

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

 Answer all questions. All question carry equal marks.   **5 × 14 Marks**

UNIT I

1.   A) Explain the features of *Python Programming Language*.(BTL2) 14 Marks

(or)

B) Explain *Loop Structures* in Python. (BTL2) 14 Marks

UNIT II

2.   A) Discuss *Basic Loop Structures* in Python with illustrations. (BTL6) 14 Marks

(or)

B) Discuss *Tuple Data Structure* in Python with examples. (BTL6) 14 Marks

UNIT III

3.   A) Explain built-in *String Methods* and *Functions* in Python.(BTL2) 14 Marks

(or)

B) Explain *Different Types of Inheritance in Python* with suitable examples. (BTL2) 14 Marks

UNIT IV

4.   A) Illustrate Operator *Overloading* by writing Python Program. (BTL2) 14 Marks

(or)

 B) Explain Exception Handling with *try-except-finally* statements. (BTL2) 14 Marks

UNIT V

5.   A). Write a Python program to create Database Table employee and also facilitate Select, Insert, Delete and Update Operations on Employee Table. (BTL2) 14 Marks

(or)

B). Write various *File Operation* by writing Python Program. (BTL2) 14 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
ADVANCED DATABASE MANAGEMENT SYSTEMS
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** I
Prerequisites: Database Management Systems   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand basic concepts of *Structured Query Language* & *Relational Algebra and Relational Calculus*.
2. To learn the basics of *Functional Dependencies and Normalization* for *Relational Databases & Transaction Processing Concepts*.
3. To learn *Concurrency Control Techniques* and *Distributed Database Concepts*.
4. To understand the *Data Models*, *Distribution Models* & *Consistency of NoSQL*.
5. To know *Querying*, *Creating*, *Updating & Deleting* Documents in *Mongo DB, Data Lakes.*

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand basic concepts of *Structured Query Language* & *Relational Algebra and Relational Calculus*.
CO2: Learn the basics of *Functional Dependencies and Normalization* for *Relational Databases & Transaction Processing Concepts*.
CO3: Learn *Concurrency Control Techniques* and *Distributed Database Concepts*.
CO4: To understand the *Data Models*, *Distribution Models & Consistency of NoSQL*.
CO5: To know *Querying*, *Creating*, *Updating* & *Deleting* documents in *Mongo DB, Data Lakes.*

UNIT I

Basic & More SQL: SQL Data Definition and Data Types - Specifying Constraints in SQL - Basic Retrieval Queries in SQL - INSERT, DELETE, and UPDATE Statements in SQL - Additional Features of SQL - More Complex SQL Retrieval Queries - Specifying Constraints as Assertions and Actions as Triggers - Views (Virtual Tables) in SQL - Schema Change Statements in SQL.
The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT- Relational Algebra Operations from Set Theory - Binary Relational Operations: JOIN and DIVISION - Additional Relational Operations - Examples of Queries in Relational Algebra - The Tuple Relational Calculus - The Domain Relational Calculus.

UNIT II

Basics of Functional Dependencies and Normalization for Relational Databases: Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms - Boyce Codd Normal Form - Multivalued Dependency and Fourth Normal Form - Join Dependencies and Fifth Normal Form.
Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions - Characterizing Schedules Based on Recoverability - Characterizing Schedules Based on Serializability -Transaction Support in SQL.

UNIT III

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

Distributed Database Concepts: Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design - Overview of Concurrency Control and Recovery in Distributed Databases - Overview of Transaction Management in Distributed Databases - Query Processing and Optimization in Distributed Databases - Types of Distributed Database Systems - Distributed Database Architectures - Distributed Catalog Management.

UNIT IV

Why NoSQL: The Value of Relational Database - Emergence of NoSQL .

Aggregate Data Models: Aggregates - Keyvalue and Document Data Models - Column Family Stores.

More Details on Data Models: Relationships - Graphs DB - Schemaless DB - Materialized Views.

Distribution Models: Single Server - Shrading - Master Slave Replication.

Consistency: Update - Read - Relax Consistency.

UNIT V

Getting Started: Documents - Collections - Databases - Data Types.

Creating, Updating & Deleting Documents: Inserting & Saving Documents - Removing Documents - Updating Documents.

Querying: Introduction to Find - Query Criteria - Type Specific Queries - Where Queries - Cursors.

Data Lakes: Introduction - What is Data Lake? - The value of the Data Lake to ING - The 5 Level Model of Governance Maturity.

Prescribed Text Book			
	Author	Title	Publisher
1	Ramez Elmasri & Shamkant B. Navathe	Fundamentals of Database Systems	Pearson, Seventh Edition, 2016
2	Pramod J.Sadalage & Martin Fowler	No SQL Distilled	Addison-Wesley, Second Edition, 2013
3	Kristina Chodorow	Mongo DB	O'Reilly, Second Edition, 2013
4	Mandy Chessell Ferd Scheepers Maryna Strelchuk Ron van der Starre Seth Dobrin Daniel Hernandez	From Data Lake to Data Driven Organization	IBM-Red Guide,2018 https://www.redbooks.ibm.com/redpapers/pdfs/redp5486.pdf

Reference Text Book			
1	Author	Title	Publisher
2	Shashank Tiwari	Professional NoSQL	Wiley, 2011, Second Edition, 2011
3	Abraham Silberschatz, Henry F Korth , S Sudarshan	Database System Comcepts	McGraw-Hill International Edition, 6th edition,2011

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)

M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
FIRST SEMESTER
ADVANCED DATABASE MANAGEMENT SYSTEMS
SYLLABUS W.E.F 2021-2022

Time 3 Hours   **Max.Marks: 70**
Answer all questions. All question carry equal marks.   **5 × 14 Marks**

1 (a) Explain *various constraints* of Relational Model. (BTL2) 7 Marks
  (b) Explain various *DML Commands*. (BTL2) 7 Marks
                                             (or)
  (c) Describe *Select* & *Project* operations of *Relational Algebra*. (BTL2) 14 Marks

2 (a) Explain *Fourth* & *Fifth* Normal Forms in detail. (BTL2) 14 Marks
                                             (or)
  (b) Explain *several problems* that can occur in Transaction Processing. (BTL2) 7 Marks
  (c) Show whether the transactions T1 & T2 ensure *serializability*. (BTL2) 7 Marks

T1	T2
read_item (X) ;	
X:=X – N;	
	read_item(X);
	X:=X + M;
write_item (X);	
read_item(Y);	
	write_item(X);
Y:=Y + N;	
write_item (Y);	

3 (a) Explain *Two-Phase Locking Techniques for Concurrency Control*. (BTL2) 7 Marks
  (b) Describe *Multiversion Concurrency Control Techniques*. (BTL2) 7 Marks
                                             (or)
  (c) Describe concepts of *Distributed Databases*. (BTL2) 7 Marks
  (d) Illustrate *Data Fragmentation*, *Replication*, and *Allocation Techniques* for Distributed Database
       Design. (BTL2) 7 Marks

4 (a) Describe *Graphs DB*, *Schemaless DB* and *Materialized Views* in detail. (BTL2) 7 Marks
                                             (or)
  (b) Explain *Shrading* and *Master Slave Replication* in detail. (BTL2) 7 Marks

5(a) How do you insert & save documents in *MongoDB*? (BTL1) 7 Marks
                                             (or)
  (b) What are *Type Specific Queries* ? *Where Queries* in detail in *MongoDB*? (BTL1) 7 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
DATA MINING
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** I
Prerequisites: Programming / Statistics Language   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1.   To understand *Fundamentals of Data Mining* & *Data Preprocessing*.
2.   To learn Data *Warehousing and Online Analytical Processing* concepts.
3.   To understand various *Mining Frequent Patterns Methods* & *Various Association Rules*.
4.   To lean different *Classification* & *Prediction* Methods.
5.   To *understand* & *apply* various Clustering Algorithms.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand *Fundamentals of Data Mining* & *Data Preprocessing*.
CO2: Learn Data *Warehousing and Online Analytical Processing* concepts.
CO3: Understand various *Mining Frequent Patterns Methods* & *Various Association Rules*.
CO4: Lean different Classification & Prediction Methods.
CO5: U*nderstand* & *apply* various Clustering Algorithms.

UNIT I
Introduction: What is Data mining **-** *What Kind of Data can be Mined* (Database Data, Data Warehouses Transactional Data, Other Kinds of Data) **-** *What kinds of Patterns can be Mined* (Class/Concept Description: Characterization and Discrimination, Mining Frequent Patterns, Associations and Correlations, Classification and Regression for Predictive Analysis , Cluster Analysis , Outlier Analysis, Are All Patterns Interesting?) **-** *Which Technologies are Used?* (Statistics, Machine Learning, Database Systems and Data Warehouses, Information Retrieval) **-** *Major Issues in Data Mining* (Mining Methodology User Interaction, Efficiency and Scalability, Diversity of Database Types, Data Mining and Society)
Data Preprocessing: *An Overview of Data Preprocessing* (Why Preprocess the Data?, Major Tasks in Data Preprocessing) **-** *Data Cleaning* (Missing Values, Noisy Data, Data Cleaning as a Process) **-** *Data Integration* (Entity Identification Problem, Redundancy and Correlation Analysis,Tuple Duplication, Data Value Conflict Detection and Resolution) **-** *Data Reduction* (Overview of Data Reduction Strategies, Attribute Subset Selection, Regression and Log Linear Models, Histograms, Sampling and Datacube Aggregation) **-** *Data Transformation* (Data Transformation strategies Overview, Data Transformation by Normalisation, Discretization by Binning).

UNIT II
Data Warehousing and Online Analytical Processing: *Data Warehouse Basic Concepts* (What Is a Data Warehouse?, Difference between Operational Database Systems and Data Warehouses, Why have a separate Data warehouse?, Data Warehousing:A Multiered Architecture, Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse, Extraction, Transformation and Loading, Metadata Repository, Datawarehouse Modeling:Datacube and OLAP, Data Cube: A Multidimensional Data Model, Stars, Snowflakes, and Fact Constellations Schemas for Multidimensional Data Models,

Dimensions: The Role of Concept Hierarchies, Measures:Their Categorisation and Computation, Typical OLAP Operations, A Starnet Query Model for Querying Multidimensional Databases) **-** *Data Warehouse Implementation* (Efficient Data Cube Computation: An Overview Indexing OLAP, Data: Bitmap Index and Join Index, OLAP Server Architectures: ROLAP versus MOLAP versus HOLAP).

UNIT III
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods:
Basic Concept (Market Basket Analysis: A Motivational Example, Frequent Itemsets, Closed Itemsets and Association Rules) **-** *Frequent itemset Mining Methods* (Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, A Pattern Growth Approach for Mining Frequent Itemsets, Mining Frequent Itemsets Using Vertical Data Format)
Advanced Pattern Mining: *Pattern Mining: A Road Map* **-** *Pattern Mining in Multilevel*, *Multidimensional Space* (Mining Multilevel Association Rules, Mining Multi Dimensional Associations, Mining Quantitative Association Rules).

UNIT IV
Classification:Basic Concepts: *Basic Concepts* (What Is Classification?, General Approaches to Classification) **-** *Decision Tree Induction* (Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction) **-** *Bayes Classification Methods* (Bayes Theorem, Naïve Bayesian Classification) **-** *Model Evaluation and Selection* (Metrics for Evaluating Classifier Performance, Holdout Method and Random Subsampling, Cross **-** Validation and Bootstrap).

Classification:Advanced Methods: *Bayesian Belief Networks* (Concepts and Mechanisms, Training Bayesian Belief Networks) - *Classification by Back Propagatio*n (A Multilayer Feed Forward Neural Network, Defining a Network Topology, Backpropagation).

UNIT V
Cluster Analysis: Basic Concepts and Methods: *Cluster Analysis* (What is Cluster Analysis? Requirements for Cluster Analysis) **-** *A Partitioning Methods (k-M*eans and K-Medoid) **-** *Hierarchical Methods* (Agglomerative versus Divisive Hierarchical Clustering, Distance Measures in Algorithmic Methods, BRICH:Multiphase Hierarchical Clustering using Clustering Feature Trees, Chameleon: Multiphase Hierarchical Clustering Using Dynamic Modeling Hierarchical Clustering) **-** *Density Based Method* (DBSCAN).
Outlier Detection: *Outliers and Outlier Analysis* (What are Outliers Analysis?, Types of Outliers) **-** *Statistical Approaches* (Parametric Methods, Nonparametric Methods).

Text Books			
	Author	Title	Publisher
1	Jiawei Han, Micheline Kamber	Data Mining : Concepts & Techniques	Morgan Kaufmann 3rd Edition, 2012 Chapter 1: 1.2,1.3,1.4,1.51.7 Chapter 3: 3.1,3.2,3.3,3.4(3.4.1,3.4.4,3.4.5,3.4.6,3.4.7,3.4.8,3.4.9),3.5(3.5.1,3.5.2,3.5.3) Chapter 4: 4.1 to 4.2.4.4(4.4.1,4.4.2.4.4.4) Chapter 6: 6.1 to 6.2(6.2.1 to 6.2.5) Chapter 7: 7.1,7.2(7.2.1 to7.2.3) Chapter 8: 8.1,8.2 (8.2.1,8.2.2,8.2.3,8.2.4),8.3,8.5(8.5.1 to 8.5.4) Chapter 9: 9.1 to 9.2(9.2.1 to 9.2.3) Chapter 10: 10.1,10.2,10.3 (10.3.1,10.3.2,10.3.3,10.3.4),10.4 (10.4.1) Chapter 12: 12.1(12.1.1,12.1.2), 12.3(12.3.1 to 12.3.2)

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

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010

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M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS

FIRST SEMESTER

DATA MINING

SYLLABUS W.E.F 2021-2022

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

Answer all questions. All question carry equal marks.   5 × 14 Marks

1. a) Define *Data Mining*. Describe the functionalities of Data Mining. (BTL1) 7 Marks
    b) What is *Noisy Data*? Explain the *Binning Methods* for Data Smoothing. (BTL1) 7 Marks
                                                   (or)
    c) What are different methods used in Data *Cleaning* and *Data Transformation* in *Data Preprocessing*? (BTL1) 14 Marks

2. a) Define *Data Warehouse*. Differentiate *Operational Databases* and *Data Warehouses*.
        (BTL1) 14Marks
                                        (or)
    b) List different schemas used in *Multidimensional Data Models* with diagrams. (BTL1)
        7 Marks
    c) What are the different OLAP operations in *Multidimensional Data Models*? (BTL1) 7 Marks

3. a) Explain the *Frequent Itemset Generation* in the *Apriori Algorithm.* (BTL2) 7 Marks
    b) Explain different types of *Association Rules* (BTL2) 7 Marks
                                    (or)
    c) Explain *FP-Growth Algorithm* with example. (BTL2) 14 Marks

4. a) Explain how classification is done using *Decision Tree*. (BTL5) 7 Marks
    b) Explain algorithm for *Decision Tree Induction.* (BTL5) 7 Marks
                             (or)
    c) Explain *Bayes Theorem* in detail. (BTL5) 7 Marks
    d) Explain *Bayesian Belief Network*. (BTL5) 7 Marks

5. a) Explain *Partitioning Methods* in *Cluster Analysis* with examples. (BTL5)
                            (or)
    b) Explain *Chameleon* & *BIRCH Hierarchical* Clustering. (BTL5) 7 Marks
    c) Explain different types of outliers. (BTL5) 7 Marks

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
MACHINE LEANING LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** II
Prerequisites: Python Programming   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand basics of *Python Programming*.
2. To gain knowledge on *Decision Control Statements* and *Functions & Modules*.
3. To familiar with *Python Strings* and *Data Structures*.
4. To gain knowledge on *Classes & Objects.*
5. To apply *Inheritance*, *Error and Exception Handling* and *Operator Overloading*.

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

1. Write a program to open Data Sets in Python. (BTL1)

2. Explain various *Plotting Techniques* of Python. (BTL2)

REGRESSION ALGORITHMS

3. Demonstrate *Simple Linear Regression* in Python with Sample Data Sets. (BTL2)

4. Demonstrate *Multiple Linear Regression* in Python with Sample Data Sets. (BTL2)

5. Demonstrate *Decision Tree Regression* in Python with Sample Data Sets. (BTL2)

6. Demonstrate *Support Vector Regression* in Python with Sample Data Sets. (BTL2)

7. Demonstrate *Random Forest Regression* in Python with Sample Data Sets. (BTL2)

CLASSIFICATION ALGORITHMS

8. Demonstrate *Logistic Regression in Python* with Sample Data Sets. (BTL2)

9. Demonstrate *Support Vector Classification* in Python with Sample Data Sets. (BTL2)

10. Demonstrate *Random Forest Classification* in Python with Sample Data Sets. (BTL2)

CLUSTERING ALGORITHMS

11. Demonstrate *K-Means Clustering* with Sample Data Sets. (BTL2)

12. Demonstrate *Hierarchical Clustering* with Sample Data Sets. (BTL2)

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010

WEB TECHNOLOGIES LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** II
Prerequisites: Programming Fundamentals   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

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

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

HTML:
1. Write HTML code to provide intra document linking. (BTL1)
2. Write HTML code to provide inter document linking. (BTL2)
3. Write a program to implement the three types of lists. (BTL1)
4. Create a HTML page using frames. (BTL6)
5. Write a program to embed college picture into your web page and   write a short note on your college using paragraph tag. (BTL1)
6. With a suitable example, depict how we can align text using a table tag as follows. (BTL3)
7. Write a program to create the time table as follows: (BTL1)
8. Create a Registration form that interacts with the user. Collect *Login Name*, *Password*, *Date of Birth*, *Sex*, *Address*, *Qualification* and display a   "Thanks for Registering" message when the user submits the form. (BTL6)

JAVA SCRIPT:
9. Write a script to compare two strings using String object. (BTL1)
10. Write a script to generate random numbers within 1 to 10 and display the numbers in a table. (BTL1)
11. Write a Java Script to update the information into the array, in the   "onClick" event of the button "Update". (BTL1)
12. Create a web page for a shopping mall that allows the user to tick   off his purchases and obtain the bill with the total being added up   simultaneously. (BTL3)

13. Write a script to find the duplicate elements of an array.

14. Write a script which generates a different greeting each time the script is executed.
15. Write a javascript to check the number is Armstrong number or not by getting the number from textbox and the result is displayed in a alert dialog box.
16. Using functions write a java script code that accepts user name and password from user,Check their correctness and display appropriate alert messages.

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

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

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

JSP:
28. Write a program to implement JSP directives.
29. Write a JSP program for session tracking.

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

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

Git:
35. Version Control Using Git.

21DS2L2

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
WEB TECHNOLOGIES LAB

SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** II
Prerequisites: Programming Fundamentals   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

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

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Build functional web applications using *HTML*.(PO1,PO3,PO5,PO7)
CO2: Create *Dynamic Web Pages* using *Java Script* and *DHTML*.(PO1,PO5,PO7)
CO3: Create *Style Sheets with XML* and write *PHP Programs for Data Retrieval*.
(PO1,PO5,PO7)
CO4: Create *JSP Applications* for *Client-Server Communication*.(PO1,PO5,PO7)
CO5: Create *Directives*, *Events*, *Data Binding* and *Database Connectivity* using *Angular JS* and *Bindings & Events using Svelte* and *Version Controlling using Git*.(PO1,PO5,PO7)

CO-PO MATRIX								
COURSE CODE	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
21DS2L2	CO1	H		L		M		L
	CO2	H				M		L
	CO3	H				M		L
	CO4	H				M		L
	CO5	H				M		L

HTML:
1. Write HTML code to provide intra document linking. (BTL1)
2. Write HTML code to provide inter document linking. (BTL2)
3. Write a program to implement the three types of lists. (BTL1)
4. Create a HTML page using frames. (BTL6)
5. Write a program to embed college picture into your web page and   write a short note on your college using paragraph tag. (BTL1)
6. With a suitable example, depict how we can align text using a table tag as follows. (BTL3)
7. Write a program to create the time table as follows: (BTL1)

8. Create a Registration form that interacts with the user. Collect *Login Name*, *Password*, *Date of Birth*, *Sex*, *Address*, *Qualification* and display a "Thanks for Registering" message when the user submits the form. (BTL6)

JAVA SCRIPT:
9. Write a script to compare two strings using String object. (BTL1)
10. Write a script to generate random numbers within 1 to 10 and display the numbers in a table. (BTL1)
11. Write a Java Script to update the information into the array, in the "onClick" event of the button "Update". (BTL1)
12. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill with the total being added up simultaneously. (BTL3)

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

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

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

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

JSP:
28. Write a program to implement JSP directives.
29. Write a JSP program for session tracking.

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

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

Git:
Version Control Using Git.

Activities:Quiz,Test,Assignment.

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
ESSENTIALS OF STATISTICS FOR DATA SCIENCE USING R
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** II
Prerequisites: Basic Probability   **Lecture-Tutorial-Practice:**4-0-0
Continuous Evaluation:30   **Semester end Evaluation:**70   **Total Marks:**100

Course Objectives:
The learning objectives include:
1. To summarize the *Data* and to obtain its *Salient Features* from the vast mass of original data.
2. To understand the concepts of *Probability*, *Random Variables* and *Probability Distribution* and its *Applications*.
3. To understand the inference about *Data Predictions* and *Test the Significance*.
4. Applying R Programming functionality to understand various Statistical concepts

Course Outcomes: After completing this course, the students should have developed a clear understanding of
CO1: *Descriptive Measures* and their use in studying various characteristics of data.
CO2: *Correlation* and *Regression* techniques to predicting the values.
CO3: Different approaches to the *Theory of Probability* and *Probability Distributions* and their Applications.
CO4: *Knowledge of Point* and *Interval Estimation Procedures* and *Different Methods of Point Estimation*, various basic concepts on *Sampling Distributions* and *Large Sample Tests* based on *Normal Distribution*.
CO5: *Small Sample Tests* based on *Chi-square*, *Student T* and *Snedekers' F Distributions*.

UNIT I
Introduction: Statistical View of the World - Sub Division within Statistics - Data Collection - Editing - Classification - Tabulation - Descriptive Statistics and Diagrammatic and Graphical representation of Data **- Introduction to R Programming:** Basic Data Types, Data Structures and Important Functions - Descriptive Statistics with R.
Bi-variate Analysis: Correlation Meaning - Types of Correlation - Measures of Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation - Rank Correlation Coefficient - Bi Serial Correlation - Cramer's V Correlation Vs Causation - Bivariate Analysis of Categorical Variables: Contingency Tables. **Bivariate Analysis with R.**

UNIT II
Probability: Various Definitions - Addition Theorem - Conditional Probability - Multiplication Theorem - Bayes' Theorem and its Applications - Random Variables: Definition, Discrete and Continuous Random Variables - Distribution Function and its Properties - Discrete Probability Distributions: Binomial, Poisson and Geometric - Continuous Probability Distributions - Uniform, Normal and Exponential Distributions - Properties and Applications. **Applications of Probability using R**

UNIT III
Sampling and Estimation: Sampling Types - Introduction to Sampling Distributions - Relationship Between Sample Size and Standard Error - Point Estimates, Interval Estimates, Confidence Intervals, Calculating Interval Estimates of the Mean from Large Samples. **Applications of Sampling with R**

UNIT IV
Testing of Hypotheses: Definition of Hypothesis and Types, Measuring the Power of a Hypothesis Test, Testing of Means and Proportions, Testing for Differences between Means and Proportions.
Analysis of Variance: One way ANOVA and Two way ANOVA
Non Parametric Tests: Chi Square Test, The Sign Test for Paired Data, The MannWhitney U Test, Kruskal Wallis Test, The Kolmogorov Smirnov Test. **Hypothesis Testing with R**

UNIT V

Regression: Introduction - Principle of Least Squares - Simple Linear Regression - Regression Coefficients - Properties of Regression Coefficients - Coefficient of Determination - Multiple and Partial Correlation (3 Variables) - Multiple Linear Regression - Logistic Regression and its Applications

Time Series Analysis. Regression and Time Series Analysis with R

Note: Proofs and derivations of statements are excluded.

Prescribed Text Books			
S.No	Author	Title	Publisher
1	Aczel,A.D.&Sounderpandian, J	Complete Business Statistics	Tata McGraw Hill, 2011, New Delhi
2	Anderson,D.,Sweeney,D.,Williams, T., Camm, J., & Cochran, J.	Statistics for Business and Economics,	Cengage Learning, 2013, New Delhi
3	Michael J. Crawley, John Wiley & Sons	Statistics : An Introduction Using R	Weily, 2015

Reference Text Books			
S.No	Author	Title	Publisher
1	Sharma, J. K.	Business Statistics	New Delhi: Pearson Education, 2103
2	Davis, G., &Pecar, B.	Business Statistics using Excel	New Delhi: Oxford University Press, 2014

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)

M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS

SECOND SEMESTER

ESSENTIALS OF STATISTICS FOR DATA SCIENCE USING R

SYLLABUS W.E.F 2021-2022

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

Answer all questions. All question carry equal marks.   **5 × 14 Marks**

Answer the following   **5 x 14M = 70Marks**

1.   (a) What is *Descriptive Statistical Analysis*? Explain it briefly. (BTL1) 7 Marks

     (b) What is *Bivariate Analysis*? How it is performed for both *Numerical* & *Categorical* Variables. (BTL1)

     7 Marks

                                                    (or)

     (c) What is the purpose of *Graphical Representation of Data*? Explain some Graphical Presentations

     using R. (BTL1) 7 Marks

     (d) What is *Data Collection*, *Classification* and *Tabulation*. Explain the process of   *Data Collection*,

     Classification and *Tabulation* with examples. (BTL1) 7 Marks

2.   (a) Explain *Addition Theorem of Probability* using an example. (BTL2) 7 Marks

     (b) Illustrate *Conditional Probability*? Explain *Baye's Theorem* without Proof. (BTL2) 7 Marks

                                                    (or)

     (c) Explain the assumption of *Poisson Distribution* and give its *Probability Distribution Function*. (BTL2)

     7 Marks

     (d) Explain the *Properties of Normal Distribution* and give its *Probability Distribution Function*. (BTL2)

     7 Marks

3.   (a) Explain various types of *Random Sampling* and also examine the *Types of Sampling*.(BTL5) 7 Marks

     (b) Explain the *Central Limit Theorem* and also state how it is useful in Statistics. (BTL5) 7 Marks

                                                    (or)

     (c) Explain *Point & Interval Estimation*. Derive the Confidence Intervals for Mean. 7 Marks (BTL5)

     (d) Explain   *Simple Random Sampling* and *Stratified Random Sampling* using R Programming? (BTL5)

4.   (a) Explain various steps of *Hypothesis Testing*. (BTL5) 7 Marks

     (b) Explain *Type-I & Type-II* errors in *Hypothesis Testing* with Examples. (BTL5) 7 Marks

                                                    (or)

(c) Explain the difference between *means* and *means of more than two samples* and also state methods to test them. (BTL5) 7 Marks

(d) Explain *Chi-Square Test.* How you use R to test the association between two Categorical Variables. (BTL5) 7 Marks

5. (a) What is *Simple Linear Regression Model*? How do you implement in R. (BTL1) 7 Marks

(b) What are the assumptions of *Multiple Linear Regression Model* and how you test them in R. (BTL1) 7 Marks

(or)

(c) What is *Logistic Regression*? What are its various Applications? Give example. (BTL1) 7 Marks

(d) How do you decompose the Time Series Data? Demonstrate with R. (BTL1) 7 Marks

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
MACHINE LEARNING
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** II
Prerequisites: Python Programming   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
The learning objectives include:
1. To know the concepts of Machine Leaning.
2. To understand basics of Data Pre-processing and Feature Selection
3. To learn Supervised Learning and Regression Algorithms.
4. To learn the concepts of Unsupervised Learning
5. To understand the concepts of Neural Networks.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1:Know the concepts of Machine Leaning.
CO2:Understand basics of Data Pre-processing and Feature Selection
CO3:Learn Supervised Learning and Regression Algorithms.
CO4:Learn the concepts of Unsupervised Learning
CO5:Understand the concepts of Neural Networks.

UNIT 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 - Modeling and Evaluation Metrics.

UNIT II

Basics of Data Preprocessing 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.

UNIT III

Supervised Learning: Introduction - Classification (Common Cassification 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.

UNIT IV

Unsupervised Learning: Introduction - Unsupervised Vs Supervised Learning - Unsupervised Learning Models - Dimensionality Reduction - Clustering : Association Rule Mining - Applications of Unsupervised Learning.

UNIT 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.

Prescribed Text Books			
	Authors	Title	Publisher
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

Prescribed Text Books			
	Authors	Title	Publisher
1	Tom Mitchell	Machine Learning	Tata McGraw Hill, 2013
2	Francois Chollet	Deep Learning with Python	Manning , 2019

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
SECOND SEMESTER
MACHINE LEARNING
SYLLABUS W.E.F 2021-2022

Time 3 Hours   **Max.Marks: 70**
Answer all questions. All question carry equal marks.   **5 × 14 Marks**

1. a) Compare Supervised, Unsupervised and Re-enforcement Learning. (BTL2) 7 Marks
    b) Explain the work flow in Machine Leaning Problem Solving (BTL2) 7 Marks
                                        (or)
    c) Explain Supervised Learning with Examples . (BTL2) 7 Marks
    d) Explain Data Splitting and methods associated with it in Machine Leaning. (BTL2) 7
       Marks

2. a) Explain three methods of Feature Transmission in detail. (BTL5) 7 Marks
    b) Explain Standard Scaling and Minimum-Maximum Scaling. (BTL5) 7 Marks
                                        (or)
    c) Explain Feature Subset Selection and its Application. (BTL5) 7 Marks
    d)Explain the basic features of SK Learning Package for Machine Learning (BTL5) 7
    Marks

3. a) What is the Classification Problem in Supervised Learning?. Explain Decision Tree
       Algorithm for Classification. (BTL1) 7 Marks
    b) What is XG-Boost Algorithm for Classification in Supervised Learning? (BTL1) 7 Marks
                                        (or)
    c) What is Multiple Linear Regression Model? Explain Multiple Linear Regression in
       Python Library Stats Models. (BTL1) 7 Marks
    d) What is meant by Regularization in Regression? Explain LASSO Regularization. (BTL1)
    7Marks

4. a) What is mean by Clustering? Explain K-Means Clustering Algorithm.
    (BTL1) 14 Marks
                                        (or)
    b) What is Hierarchical Clustering? Explain it with suitable Algorithm in SK-Learn Package.
    (BTL1) 14 Marks

3. a) What is meant by Neuron? Explain its Basic Features. (BTL1) 7 Marks
    b) What is an Activation Function? Explain different Types of Activation Functions.(BTL1)
       7 Marks
                                        (or)
    c) What is Convolution Neural Networks? Explain its various Parameters. (BTL1) 7 Marks

d)What is meant by Gradient Descent? What is its use in Neural Networks?. (BTL1) 7Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
INTERNET OF THINGS
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** II
Prerequisites: Basic Progarmming & Digital Circuits   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand the *Design Concepts* and *Technologies* of Internet of Things.
2. To learn the *Hardware Platforms* and develop the *IOT Applications* using *Arduino* and *Raspberry Pi Programming*.
3. To learn *IOT Design Methodologies* and develop *Python Programs* for IoT
4. To implement the case studies for *Smart Home Automation* and *Smart Cities* in IoT system
5. To know *Data Acquiring*, *Business Models* and *Business Processes*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand the *Design Concepts* and *Technologies* of Internet of Things.
CO2: Understand the *Hardware Platforms* and develop the *IOT Applications* using *Arduino* and *Raspberry Pi Programming.*
CO3: Understand *IOT Design Methodologies* and develop Python Programs for IoT.
CO4: Implement the case studies for *Smart Home Automation* and *Smart Cities* in IoT system.
CO5:Understand *Data Acquiring*, *Business Models* and Business Processes.

UNIT I
Introduction to Internet of Things: Introduction - Physical Design of IoT - Logical Design of IoT- IoT Enabling Technologies - IoT Levels & Deployment Templates.
Domain Specific IoTs: Home Automation, Cities.
IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT.

UNIT II
The Basics of Sensors and Actuators: Introduction - A Brief Introduction to Sampling Theory - Examples of Sensors and working Principles - Actuators.
Reading from Sensors: Sensing the World - Reading from Analog Sensors - Digital Sensors - Sensors with *On / Off* State.

The Arduino Microcontroller Platform: Microcontrollers - Programming Microcontrollers - The Arduino Platform - The Anatomy of an Arduino Board - The Development Environment - Setting up the IDE - Writing Arduino Software (Some basic examples, Arduino simulator).

UNIT III
IoT Platforms Design Methodology: Introduction - IoT Design Methodology - Case Study on IoT System for Weather Monitoring.
IoT systems - Logical Design using Python: Introduction - Python Data Types and Data Structures - Control Flow - Functions - Modules - Packages - File Handling - Date/Time Operations - Classes - Python Packages for IoT.
UNIT IV

IoT Physical Devices & Endpoints: IoT Device - Raspberry Pi Board - Raspberry Pi Interfaces - Programming Raspberry Pi with Python.
Case Studies Illustrating IoT Design: Home Automation - Cities.

UNIT V

Data Acquiring - Organizing and Analytics in IoT / M2M, 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.
IoT Datasets: Beach Water Quality Dataset - Gas Sensor Array Drift Dataset - GeoLife GPS Trajectories - IoT Intrusion Detection System Dataset

Prescribed Text Books			
	Author	Title	Publisher
1	Vijay Madisetti and Arshdeep Bahga	Internet of Things (A Hands-on-Approach)	First Edition, VPT, 2014.
2	Charalampos Doukas	Building Internet of Things with the Arduino	A Press, 2012
3	Rajkamal	Internet of Things: Architecture, Design Principles and Applications	McGraw Hill Higher Education, 2017

Reference Text Books			
	Author	Title	Publisher
1	Francis daCosta	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	Edition, A press Publications, 2013
2	Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence	First Edition, Academic Press, 2014.

E-resources and other Digital Material:
[1]. https://www.youtube.com/watch?v=G4-CtKkrOmc
[2]. http://www.cse.wustl.edu/~jain/cse570-13/m_18iot.htm
[3]. https://www.youtube.com/watch?v=9ZUFYyXhQm8
[4]. https://www.udemy.com/introduction-to-iot-using-raspberry-pi-2/

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M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
SECOND SEMESTER
INTERNET OF THINGS
SYLLABUS W.E.F 2021-2022

Time 3 Hours   **Max.Marks: 70**
Answer all questions. All question carry equal marks.   **5 × 14 Marks**

1.(a) Explain Physical & Logical Design of IoT. (BTL2) 14 Marks
                            (or)
  (b) Differentiate between IoT & M2M. (BTL2) 14 Marks

2.(a) Explain Sampling. Give the examples of *Sensors* & *Working Principles*.(BTL2) 14 Marks
                            (or)
  (b) Illustrate anatomy of Aurdino Board and its Development Environment. (BTL2) 14 Marks

3.(a) Explain Python Data Types & Data Structures. (BTL2) 14 Marks
                            (or)
  (b) Explain Classes and Packages used in IoT. (BTL2)14 Marks

4.(a) Discuss Raspberry Pi interfaces & Programming. (BTL6) 14 Marks
                            (or)
  (b) Discuss Home Automation using Case Study. (BTL6)14 Marks

5.(a) Explain Data Acquiring and Storage in IoT / M2M. (BTL5) 14 Marks
                            (or)
  (b) Explain Business Models for Business Processes in the IoT. (BTL5) 14 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
DESIGN & ANALYSIS OF ALGORITHMS
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** II
Prerequisites: Data Structure   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand *Algorithms*, *Analysis*, *Elementary Data Structures*.
2. To gain familiarity in *Divide -and -Conquer Technique* and *The Greedy Method*.
3. To apply the concepts of *Dynamic Programming* and *Basic Traversal and Search Techniques*.
4. To understand the concepts of *Backtracking* and   *Branch and Bound Techniques*.
5. To acquire knowledge in *NP Hard* and *NP Complete Problem*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand *Algorithms*, *Analysis*, *Elementary Data Structures*.
CO2: Gains familiarity in *Divide-and-Conquer Technique* and *The Greedy Method*.
CO3: Apply the concepts of *Dynamic Programming* and *Basic Traversal and Search Techniques*.
CO4: Understand the concepts of *Backtracking* and   Branch and Bound techniques.
CO5: Acquire knowledge in *NP Hard* and *NP Complete Problem*.

UNIT I
Introduction: What IS Algorithm - Algorithm Specification - Pseudocode 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: Binary Trees - Dictionaries (Binary Search Trees, Priority Queues, Heaps, Heap sort) - Sets and Disjoint Set Union (Introduction, Union and Find Operations).

UNIT 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.

UNIT 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.

UNIT IV

Backtracking: The General Method - The 8 Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian Cycles - Knapsack Problem.
Branch and Bound : The Method: (Least Cost Search The 15 Puzzle Control Abstractions for LC Search, Bounding,FIFO Branch and Bound- LC Branch and Bound)- 0/1 Knapsack Problem (LC Branch and Bound Solution - FIFO Branch and Bound Solution) - Traveling Sales Person.

UNIT 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.

Prescribed Text Books			
S.No.	Author	Title	Publisher
1	Sartaj Sahni	Fundamentals of Computer Algorithms	Second Edition, Universities Press, 2008
2	Coremen TH Leiserson CE, Rivest R L and Stein, Clifford.	Introduction to Algorithms	PHI , Third Edition, 2010 35th Chapter

Reference Text Books			
S.No.	Author	Title	Publisher
1	Anany Levitin	Introduction to the Design & Analysis of Algorithms	Second Edition, Pearson Education (2007)
2	I.Chandra Mohan	Design and Analysis of Algorithms	PHI
3	Prabhakar Gupta, Vineet Agrawal	Design and Analysis of Algorithms	PHI
4	Parag Himanshu, Dave	Design and Analysis of Algorithms	Pearson Education (2008)

21DS2T4

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010

(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)

M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS

SECOND SEMESTER

DESIGN & ANALYSIS OF ALGORITHMS

SYLLABUS W.E.F 2021-2022

Time 3 Hours	**Max.Marks: 70**
Answer all questions. All question carry equal marks.	**5 × 14 Marks**

1.a) Define Algorithm. Discuss *Performance Analysis of Algorithms* briefly. (BTL2) 14 Marks

(or)

  b) Explain Disjoint Sets, Disjoint Set Union & Find Operations with Algorithms. (BTL2)

14Marks

2.a) Discuss the method for *Divide_ and_ Conquer* approach and write algorithm for
      Quick Sort with an example. (BTL6) 14 Marks

(or)

  b) Discuss the general method for *Greedy Method*. Apply it on *Single Source
      Shortest Path* by writing algorithm with suitable example. (BTL6) 14Marks

3. a) Explain algorithm and procedure of finding *Optimal Binary Search Tree* using Dynamic
        Programming with example. (BTL2) 14 Marks

(or)

  b) Explain *Traversal Techniques for Graphs* with an example. (BTL2) 14 Marks

4. a) Explain *Control Abstraction for LC Search*. Solve *0/1-Knapsack Problem* using
        Branch and Bound Technique. (BTL5) 14 Marks

(or)

  b) Explain the *Sum of Subsets Problem.* How it can be solved using *Back Tracking Technique?*.
      (BTL5) 14 Marks

5. a) Explain the procedure for *COOK's Theorem*. (BTL2) 14 Marks

(or)

  b) Explain various *NP Hard Graph Problems in detail*. (BTL2) 14 Marks

2. **P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**
3. **(An Autonomous College in the jurisdiction of Krishna University)**
M.Sc., (Computer Science) Programme - II Semester

COURSE	COURSE CODE	L	T	P	C	Year
TECHNICAL REPORT WRITING	21DS2TRW	4	-	-	4	2020-21

Course Outcomes:-After completion of the course students will be able to

CO1. List the different sections of a technical report (PO1)
CO2.Explain the purpose and function of each section in a technical report. (PO2)
CO3. Identify the appropriate referencing style for a given technical report. (PO6)
CO4. Assess strengths and weaknesses of various technical writing styles in existing reports.(PO3)
CO5.Assess skills mastery by creating a well-structured technical report on a chosen topic.(PO7)

CO-PO MATRIX								
COURSE CODE **4. 21DS2TR W**	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO1	H						
	CO2		H					
	CO3						L	
	CO4			M				
	CO5							H

Technical report writing is a specific style of writing used to communicate technical information in a clear, concise, and objective manner. This type of writing is commonly used in fields like computer science, engineering, and science to document research findings, project outcomes, or even complex technical concepts.
The key aspects of technical report writing:
Structure:
- **Formal and organized:** Technical reports follow a standard structure with well-defined sections like abstract, introduction, methodology, results, discussion, conclusion, and references.
- **Targeted audience:** The level of detail and technical jargon used is adjusted based on the intended audience. Reports for experts might use more technical terms, while reports for a broader audience might explain concepts in simpler terms.

Writing Style:
- **Formal and objective:** Avoids personal opinions or biases.
- **Clear and concise:** Uses precise language and avoids ambiguity.
- **Active voice preferred:** Emphasizes what is being done rather than who is doing it.
- **Minimal jargon:** Defines technical terms if necessary.
- **Grammatically correct and well-proofread:** Ensures clarity and professionalism.

Overall, technical report writing is a valuable skill for anyone working in a technical field. By following these principles and tailoring them to your specific project or research, you can create reports that effectively communicate your work and its significance.

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
WEB TECHNOLOGIES
SYLLABUS W.E.F 2021-2022

Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** II
Prerequisites: Basic Programming Language   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand the concepts of WWW including *Browser* and *HTTP Protocol* .
2. To Apply HTML Tags, the *JavaScript &* CSS to create *Dynamic Web Pages*.
3. To Create *Modern Web Pages* using the *XML Elements* and Servlets.
4. Able to apply develop *Server Side Scripting* with PHP and JSP and C# including Database Connectivity Form Validations.
5. Able to develop *Interactive Forms* for Web Applications using *Node* and *Express*.

Course Outcomes:
On successful completion of this course, the students will be able to:
CO1: Understand the concepts of WWW including *Browser* and *HTTP Protocol*(PO1,PO2)
CO2: Apply *HTML Tags, JavaScript* and CSS to create *Dynamic Web Pages*. (PO1,PO3,PO5)
CO3: Create *Modern Web Pages* using the *XML Elements* and Servlets. (PO1,PO3,PO5)
CO4: Apply Server *Side Scripting* with PHP ,JSP and C# including Database Connectivity Form Validations.(PO1,PO3,PO5)
CO5: Develop *Interactive Forms* for Web Applications using *Node* and *Express*.(PO1,PO3,PO5)

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
21OE03	**CO1**	M	M					
	CO2	H		L		M		
	CO3	H		L		M		
	CO4	H		L		M		
	CO5	H		L		M		

UNIT I
Introduction: What is Internet - History of Internet - Internet Services and Accessibility - Uses of the Internet - Protocols - Web Concepts: The Client/Server Model, Retrieving Data from the Web, How the Web Works? - Web Browsers - Searching information on the Web - Internet Standards.
HTML: Outline of an HTML Document - Head Section Body Section: Headers, Paragraphs, Text Formatting, Linking, Internal Linking, Embedded Images, Lists, Tables, Frames, Other Special Tags and Characters, HTML Forms.

UNIT II

Java Script: Introduction to Scripting - Control Statements I - Control Statements II - Functions - Arrays, Objects - Document Object Model - Events.

Dynamic HTML (DHTML): Introduction - Cascading Style Sheets (CSS) - Coding CSS - Properties of Tags - Property Values - Other Style Properties - In Line Style Sheets - Embedded Style Sheets - External Style Sheets - Grouping – Inheritance - Class as Selector - ID as Selector - Contextual Selector - Pseudo Classes and Pseudo Elements - Positioning – Backgrounds -Element Dimensions - DHTML Document Object Model and Collections - Using the Collections All - Moving Object around the Document - Event Handling - Assigning Event Handlers - Event Bubbling - Filters and Transition Filters - Transitions - Data Binding - Using Tabular Data Control - Sorting Data - Dynamic Sorting - Filtering.

UNIT III

XML: Introduction, HTML vs. XML - Syntax of XML Document - XML Attributes - Use of elements vs. Use of Attributes - XML Validation - Well Formed XML Documents - Valid XML Documents - XML DTD: Internal DTD, External DTD - The Buildings blocks of XML Documents, DTD Elements : Declaring an Element, Empty Elements, Elements with Data, Elements with Children - Wrapping - Declaring only one Occurrence of the Same Elements - Declaring Minimum one Occurrence of the Same Element - Defining Zero or One Occurrence of the Same Element - Declaring Mixed Content - DTD Attributes: Declaring Attributes, Default Attribute Value, Implied attribute, required attribute, fixed attribute value, enumerated attribute values, DTD Entries, DTD Validation, XSL, XSL Transformation, XML NameSpaces, XML Schema.

Servlets: Introduction - Advantages of Servlets over CGI - Installing Servlets - The Servlet Life Cycle - Servlets API - A Simple Servlet - Handling HTTP Get Requests - Handling HTTP Post Requests - Cookies - Session Tracking - Multi Tier Applications using Database Connectivity - Servlets Chaining.

UNIT IV

PHP: Introduction - PHP Basics - String Processing and Regular Expressions - Form Processing and Business Logic - Connecting to a Database - Using Cookies - Dynamic Content - Operator Precedence Chart.

Java Server Pages (JSP): Introduction - Advantages of JSP - Developing first JSP - Components of JSP - Reading Request Information - Retrieving the Data Posted from a HTML File to a JSP File - JSP Sessions - Cookies - Disabling Sessions.

Database Connectivity & Form Validations using C#: Database Connectivity using C#.Net-Form Validations (Name Validation, Integer Validation, Floating Point Validation, Email Validation, Combo Box Validation).

UNIT V

Getting Started with Node: Getting Node - Using the Terminal - Editors - npm - A Simple Webserver with Node (Hello World, Event Driven Programming, Routing, Serving Static Resource).

Saving Time with Express: Scaffolding - Initial Steps (Views and Layouts, Static Files and Views, Dynamic Content in Views).

Form Handling: Sending Client Data to Server - HTML Forms - Encoding - Approaches in Form Handling - Form Handling with Express - Handling AJAX Forms – File Uploads- jQuery File Upload.

Prescribed Text Book			
S.No.	Author	Title	Publisher
1	N.P.Gopalan, J.Akilandeswari	Web Technologies - A Developer's Perspective	PHI(2008)
2	Harvey M.Deitel and Paul L. Deitel	Internet and World Wide Web How To Program, 5th Edition	Prentice Hall, 4th Edition
3	Ethan Brown	Web Development with Node & Express	O'Reilly, First Edition, 2014

Reference Text Books			
S.No.	Author	Title	Publisher
1	Vikas Gupta	Comdex .Net 4.5 Programming Course Kit	Dreamtech Press, 2014
2	Robert W. Sebesta	Programming the World Wide Web.	Third Edition, Pearson Education, 2007
3	Anders Moller and Michaelschwarzbach	An Introduction to XML and Web Technologies.	Addison Wesley, 2006
4	Chris Battes	Web programming-Building Internet Application.	Second Edition, Wiley, 2007.
5	Jeffrey C. fackson	Web Technologies- Computer Science Perspective.	Pearson Education, 2008.

Activites:Wokshop,Contest,Quiz

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
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DEEP LEARNING LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** III
Prerequisites: Python Programming   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
 1.   To learn developing *Face Recognition Application*.
 2.   To learn developing *Voice Recognition Application*.
 3.   To learn developing *Object Recognition Application*.
 4.   To learn developing *Object Counting Application*.
 5.   To learn developing *Sentiment Analysis Application* & *Fake News Detection Application.*

Course Outcomes:
On successful completion of this course, the students able to:
CO1: To learn developing *Face Recognition Application*.
CO2: To learn developing *Voice Recognition Application*.
CO3: To learn developing *Object Recognition Application*.
CO4: To learn developing *Object Counting Application*.
CO5: To learn developing *Sentiment Analysis Application* & *Fake News Detection Application.*

1.   Implement *Face Recognition Application* using any frame work. (CO1,L6)

2.   Implement *Voice Recognition Application* using any frame work. (CO2,L6)

3.   Implement *Object Recognition Application* using any frame work. (CO3,L6)

4.   Implement *Object Counting Application* using any frame work. (CO4,L6)

5.   Implement *Sentiment Analysis Application* using any frame work. (CO5,L6)

6.   Implement *Detection of Fake News Application* using any frame work. (CO5,L6)

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
BIG DATA AND ANALYTICS LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** III
Prerequisites: Linux   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To implement *Hadoop Installations*, *Hadoop Commands*,*Word Count* in Hadoop
2. To implement *Pig Installation*, *Pig Commands*, *MongoDB*.
3. To implement *MongoDB Commands*, *Tasks On Mongodb*, *Bulk Documents in Mongodb*, *Arrays in Mongodb*.
4. To implement Map Reduce in *Mongodb*, *Aggregate Functions* in *Mongodb*, *Mongo Import & Export*.
5. To implement *Spark Installation*, *Operations of Rdd*, *Working With Data Frames*, *Spark SQL Operations*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Implement *Hadoop Installations*, *Hadoop Commands*,*Word Count* in Hadoop
CO2: Implement *Pig Installation*, *Pig Commands*, *MongoDB*.
CO3: Implement *MongoDB Commands*, *Tasks On Mongodb*, *Bulk Documents in Mongodb*, *Arrays in Mongodb*.
CO4: Implement Map Reduce in *Mongodb*, *Aggregate Functions* in *Mongodb*, *Mongo Import & Export*.
CO5: Implement *Spark Installation*, *Operations of Rdd*, *Working With Data Frames*, *Spark SQL Operations*.

1. Hadoop Installation Steps. (CO1,L3)
2. Hadoop Commands. (CO1,L3)
3. Word Count Program in Hadoop. (CO1,L1)
4. Pig Installation Steps. (CO2,L3)
5. Pig Commands. (CO2,L3)
6. Introduction to Mongodb. (CO3,L1)
7. Mongodb Commands. (CO3,L3)
8. Tasks on Mongodb. (CO3,L3)
9. Creating Bulk Documents in Mongodb. (CO3,L6)
10. Arrays in Mongodb. (CO3,L1)
11. Map Reduce in Mongodb. (CO4,L3)
12. Aggregate Functions in Mongodb. (CO4,L3)
13. Mongo Import. (CO4,L3)
14. Mongo Export. (CO4,L3)
15. Spark Installation. (CO5,L3)
16. Operations of Rdd. (CO5,L3)
17. Working With Data Frames. (CO5,L3)
18. Spark Sql Operations. (CO5,L3)

COURSE	COURSE CODE	L	T	P	C	Year
MINI PROJECT	21DS3P1	-	-	45	4	2020-2021

Course Outcomes:

On successful completion of this course, the students:

CO2: Outline reflection, personal strengths, weaknesses, and future project goals.(PO7)

CO3: Apply problem-solving skills and principles to develop a solution for the chosen mini project.(PO1)(PO2)

CO4: Analyze and apply computer science concepts to implement a functional mini project. .(PO1)(PO2)

CO5: Design and execute a project plan effectively, demonstrating teamwork and problem-solving skills. .(PO2)(PO5)

CO6: Evaluate and justify design decisions, demonstrating critical thinking and communication Skills.(PO1)

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO2							H
CA4P1A	CO3	H	H					
	CO4	H	H					
	CO5		H			H		
	CO6	H						

The project will be assigned in the final semester. The project will be performed at the established industry (or) in the department under the supervision of the faculty or research institutes. It may involve experimental and/or theoretical work as well as critical review of the literature. Each of the students has to carry out original research in a topic in accordance with the work chosen under the guidance and supervision of a teacher in the concerned Department of the college.

Dissertation must be submitted at the end of the semester which will be assessed by the external examiners. Dissertation must be prepared with introduction, Review of the literature, Experimental Session, Results and Discussion, Conclusion and References.

The final dissertation should have at least 40 – 60 pages typed in Times New Roman 12 font except Headings and side headings with 1.5 line spacing.

PROJECT WORK

- All the candidates shall undertake a Project Work of **three months duration** in the fourth semester. The project should have industry orientation and the work should be certified by the concerned organization where the student has undertaken the project work. The project work shall be guided and certified by the teacher-guide.

- The purpose of the project work is primarily to demonstrate the application of knowledge of skills acquired in the M.Sc(Computer Science) programme, by studying and analyzing a selected problem in the work situation in a systematic manner while suggesting solution. Each student is required to study the problem under the guidance of a faculty member of the department.

- The completed project should be submitted to the College as per the guidelines prescribed by the Examination Section from time to time.

- Internal assessment of project work will be done by the concerned project internal guide and HOD for 50 marks.

Evaluation Schema for Continuous **Internal** Assessment of Project Work		
Review-I	Submission of Abstract	10 Marks
Review-II	Submission of Data Dictionary & UML/ER Diagrams	10 Marks
Review-III	Project Execution	15 Marks
Thesis Submission		15 Marks
Total		50 Marks

The Candidate should have to secure minimum 50% marks in Project work

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
CLOUD COMPUTING
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** III
Prerequisites: Programming Skills, Databases, Security and Privacy   Lecture-Tutorial-Practice: 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand the *Benefits of Cloud Computing* and *Virtualization*.
2. To understand the *Services* and *Deployment Models* of *Cloud Computing*.
3. To develop *Cloud Applications* using *Open Source Cloud Software*.
4. To understand the *Risks*, *Consequences* and *Costs for Cloud Computing*, *AAA Model*.
5. To understand *Application Development for Cloud* and *Architecture*, *Challenges and Benefits of Mobile Cloud Computing*.

Course Outcomes:
On successful completion of this course, the students able to:
CO1: Understand the *Benefits of Cloud Computing* and *Virtualization*.
CO2: Understand the *Services* and *Deployment Models* of *Cloud Computing*.
CO3: Develop *Cloud Applications* using *Open Source Cloud Software*.
CO4: Understand the *Risks*, *Consequences* and *Costs for Cloud Computing*, *AAA Model*.
CO5: Understand *Application Development for Cloud* and *Architecture*, *Challenges and Benefits of Mobile Cloud Computing*.

UNIT I
Era of Cloud Computing: Getting to Know the Cloud - Peer to Peer - Client Server and Grid Computing - Cloud Computing versus Client Server Architecture - Cloud computing versus Peer To Peer Architecture - Cloud computing versus Grid Computing - How we got to the Cloud - Server Virtualization versus Cloud Computing - Components of Cloud Computing - Cloud Types - Cloud Computing Service Delivery Models.
Introducing Virtualization: Introducing Virtualization and its Benefits - Implementation Levels of Virtualization - Virtualization at the OS Level - Virtualization Structure - Virtualization Mechanisms - Open Source Virtualization Technology - Binary Translation with Full Virtualization - Virtualization of CPU - Memory and I/O Devices - Hardware support for Virtualization in Intex x86 Processor.

UNIT II
Cloud Computing Services: Infrastructure as a Service - Platform as a Service - Language and Pass - Software as a Service - Database as a Service.
Open Source Cloud Implementations and Administration: Open Source Eucalyptus Cloud Architecture - Open Source Open Stack Cloud Architecture - Private Cloud Deployment using Eucalyptus - Cloud Implementation using OpenStack and Meghdooth (Single Node & Multi Node).

UNIT III
Application Architecture for Cloud: Cloud Application Requirements - Recommendations for Cloud Application Architecture - Fundamental Requirements for Cloud Application Architecture - Relevance and use of Client Server architecture for Cloud Application - Service Oriented Architecture for Cloud Applications.
Cloud Programming: Programming Support for Google Apps Engine - Big Table as Google's NOSQL System - Chubby as Google Distributed Lock Service - Administrating AWS - Deploying in AWS.

UNIT IV

Risks, Consequences and Costs for Cloud Computing: Introducing Risks in Cloud Computing - Risk Assessment and Management - Risk of Vendor Lock In - Risk of Loss Control - Risk of Not Meeting Regulatory Compliances - Risk of Resource Scarcity - Risk in Multi Tenant Environment - Risk of Failure - Risk of Failure of Supply Chain - Risk of Malware and Internet Attacks - Risk of Inadequate SLA - Risk of Management of Cloud Resources - Risk of Network Outages - Risks in the Physical Infrastructure - Direct and Indirect Cloud Costs - Calculating Total Cost of Ownership for Cloud Computing - Cost Allocations in a Cloud.

AAA Administration for Clouds: The AAA Model - Single Sign On for Clouds - Industry Implementations for AAA - Authentication Management in the Cloud - Authorization Management in the Cloud.

UNIT V

Application Development for Cloud: Developing on Premise Versus Cloud Applications - Modifying Traditional Applications for Deployment in Cloud - Stages during the development process of Cloud Application - Managing a Cloud Application - Using Agile Software Development for Cloud Application - Cloud Applications: What Not to do - Static Code Analysis for Cloud Applications - Developing Synchronous and Asynchronous Cloud Applications.

Mobile Cloud Computing: Definition of Mobile Cloud Computing - Architecture of Mobile Cloud Computing - Benefits of Mobile Cloud Computing - Mobile Cloud Computing Challenges.

Prescribed Text Books			
S.No	Author	Title	Publisher
1	KailashJayaswal,JagannathKallakurchi, Donald J. Houde& Dr. Deven Shah	Cloud Computing, Black Book	Dreamtech Press

Reference Text Books			
S.No	Author	Title	Publisher
1	Thomas Erl, ZaighamMahmood, Ricardo Puttini	Cloud Computing- Concepts Technolo Architecture	Pearson
2	Raj Kumar Buyya, Christen Vecctiola, S Tammaraiselvi	Mastering Cloud Computing, Foundat Application Programming	TMH

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS THIRD SEMESTER
21DS3T1- CLOUD COMPUTING
SYLLABUS W.E.F 2021-2022

Time 3 Hours   **Max.Marks: 70**
Answer ALL questions   **(10×2 = 20 Marks)**
 1)
   a)   Define SaaS (CO1,L1)
   b)   What is Virtualization? (CO1,L1)
   c)   What is an Open Source? (CO2,L1)
   d)   What is Eucalyptus (CO2,L1)
   e)   What are the Advantages of SOA (CO3,L1)
   f)   What are the Drawbacks of GFS (CO3,L1)
   g)   List the risks of Malware (CO4,L1)
   h)   What is Authentication (CO4,L1)
   i)   What not to do in Cloud Application Development (CO5,L1)
   j)   What are the advantages of MCC (CO5,L1)

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

2) a) Explain the *Various Types of Cloud* with neat diagrams. (CO1,L2) 5 Marks
    b) Compare and contrast Cloud Computing Architecture with Peer to Peer Architecture. (CO1,L2) 5 Marks
                              (or)
    b) Explain *Virtualization* and its benefits and levels. (CO1,L2) 5 Marks
    c) Explain the *Virtualization Structures* and *Virtualization Mechanisms*. (CO1,L2) 5 Marks

3) a) Explain *Cloud Computing Services*. (CO2,L2) 10 Marks
                              (or)
    b) Explain *Open Source Cloud Architectures*. (CO2,L2) 10 Marks

4) a) Summarize the requirements of *Cloud Application*. (CO3,L2) 5 Marks
    b) Explain *Service Oriented Architecture* for Cloud Applications. (CO3,L2) 5 Marks
                              (or)
    c) Explain the *Big Table* as Google's NoSQL System. (CO3,L2) 5 Marks
    d) Explain *Elastic Block Store*. (CO3,L2) 5 Marks

5) a) Explain the *Risks in Cloud Computing*. (CO4,L2) 10 Marks
                              (or)
   b) Describe the *AAA Model for Clouds*. (CO4,L2) 10 Marks

6) a) What are the *Stages during the Development Process* of *Cloud Applications*? (CO5,L1) 5 Marks
   b) How can we use *Agile Software Development* for *Cloud Applications*? (CO5.L1) 5 Marks
                              (or)
   c) What are the benefits and challenges of *Mobile Cloud Computing*? (CO5,L1)5 Marks
   d) What are the components in Mobile Cloud Computing? (CO5,L1) 5 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
CYBER SECURITY
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** III
Prerequisites: Computer Networks & Cryptography and Network Security   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand the concepts of *Computer and Network Security*, *Classical Encryption Techniques and Advanced Encryption Standard*.
2. To know *Public Key Cryptography and RSA*, *Key Management*, *Message Authentication Codes*.
3. To be aware of *Cyber Crimes & Cyberoffenses*.
4. To understand *Mobile & Wireless Devices*, *Tools* and *Methods* used in *Cyber Crime*.
5. To know Forensics of *Hand Held Devices* and *Case Studies of Cyber Crimes*.

Course Outcomes:
On successful completion of this course, the students able to:
CO1: Understand the concepts of *Computer and Network Security*, *Classical Encryption Techniques and Advanced Encryption Standard*.
CO2: Know *Public Key Cryptography and RSA*, *Key Management*, *Message Authentication Codes*.
CO3: Be aware of *Cyber Crimes & Cyberoffenses*.
CO4: Understand *Mobile & Wireless Devices*, *Tools* and *Methods* used in *Cyber Crime*.
CO5: Know forensics of *Hand Held Devices* and *Case Studies of Cyber Crimes*.

UNIT I
Computer and 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 - Rotor Machines - Steganography.
Advanced Encryption Standard: AES Structure - AES Transformation Functions - AES Key Expansion - An AES Example.

UNIT II
Public Key Cryptography and RSA: Principles of Public Key Crypto Systems - The RSA Algorithm.
Key Management: Other Public Key Crypto Systems: Diffie Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.
Message Authentication Codes: Authentication Requirements - Authentication Functions - Message Authentication Codes.
UNIT III
Introduction to Cybercrime: Introduction - Cybercrime:Definition and Origins of the Word -Cybercrime and Information Security - Who are Cybercriminals? - Classifications of Cybercrimes - Cybercrime: The Legal Perspectives - Cybercrimes: An Indian Perspective - Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes - Cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

Cyberoffenses: How Criminals Plan Them: Introduction - How Criminals Plan the Attacks -Social Engineering - Cyberstalking - Cybercafe and Cybercrimes - Botnets: The Fuel for Cybercrime - Attack Vector - Cloud Computing.

UNIIT IV

Cybercrime: Mobile and Wireless Devices: Introduction - Proliferation of Mobile and Wireless -Devices - Trends in Mobility - Credit Card Frauds in Mobile and Wireless Computing Era - Security Challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service Security - Attacks on Mobile/Cell Phones - Mobile Devices: Security Implications for Organizations - Organizational Measures for Handling Mobile - Organizational Security Policies and Measures in Mobile Computing Era - Laptops.

Tools and Methods Used in Cybercrime: Introduction - Proxy Servers and Anonymizers - Phishing - Password Cracking - Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors - Steganography - DoS and DDoS Attacks - SQL Injection - Buffer Overflow - Attacks on Wireless Networks.

UNIT V

Forensics of Hand Held Devices: Introduction - Understanding Cell Phone Working Characteristics - Hand Held Devices and Digital Forensics - Toolkits for Hand-Held Device Forensics - Hunting threats with Pandas - MFT Analysis - Extracting Feature Vectors From URL Strings For Malicious URL Detection - Monitor Active SSH Sessions With Prometheus and Grafana.

Cybercrime: Illustrations, Examples and Mini Cases: Introduction - Real Life Examples - Mini Cases - Illustrations of Financial Frauds in Cyber Domain - Digital Signature - Related Crime Scenarios - Digital Forensics Case Illustrations - Online Scams.

Prescribed Text Book			
	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Seventh Edition, 2017
2	Nina Godbole, Sunit Belapur	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Wiley India Publications, Second Edition April, 2011

Reference Text Book			
	Author	Title	Publisher
1	William Stallings	Network Security Essentials -Applications and Standards	Pearson Education (2007), Third Edition.
2	Chris McNab	Network Security Assessment	OReilly (2007), 2nd Edition
3	Jon Erickson	Hacking-The Art of Exploitation	Press (2006),SPD
4	Neal Krawety	Introduction to Network Security	Thomson (2007)
5	Ankit Fadia	Network Security-A Hackers Perspective	Macmillan (2008)

e-Resources https://towardsdatascience.com/tagged/cybersecurity

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University,
A.P., India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS THIRD SEMESTER
21DS3T2 -CYBER SECURITY
SYLLABUS W.E.F 2021-2022

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

1.
   a. List out Security Attacks (CO1,L1)
   b. Define AES Structure (CO1,L1)
   c. What are Authentication Requirements (CO2,L1)
   d. List different Authentication Functions (CO2,L1)
   e. Who are Cybercriminals(CO3,L1)
   f. How criminals plan the attacks(CO3,L1)
   g. What is DOS Attack (CO4,L1)
   h. What is Phishing (CO4,L1)
   i. List out different Online Scams (CO5,L1)
   j. What are the Advantages of Digital Signature(CO5,L1)

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

2. a) Explain *Security Attacks* and *Security Mechanism*. (CO1,L2) 5 Marks
   b) Explain *Substitution Techniques* in *Encryption* with examples.(CO1,L2) 5 Marks
                                                      (or)
   c) Explain the AES Cipher Encryption. (CO1,L2) 10 Marks

3. a) Find e using RSA Algorithm with p=3, q=11, d=7 and what is the cipher
      text character corresponding to the plain text character N using the number
      corresponding to the letter the number 1 stands for 'A'. (CO2,L1) 5 Marks
   b)What is *Message Authentication*? (CO2,L1) 5 Marks
                                                      (or)
   b) Define Hash Functions and its Security. (CO2,L1) 5 Marks
   c) How does *Diffie-Hellman Key Exchange works*? (CO2,L1) 5 Marks

4. a) Who are Cyber Criminals? Classify various Cyber Crimes. (CO3,L1) 10 Marks
                                                      (or)
   b) What are Cyberstalking and Botnets? (CO3,L1) 10 Marks

5. a) Explain the Measures for Handling Mobile Security Policies. (CO4,L2) 10 Marks
                                                      (or)
   b) Explain *Virus*, *Worms*, *Trojan Horses* & *Backdoors* in detail. (CO4,L2) 10 Marks

6. a) Explain *Cell Phone Working Characteristics* and *Digital Forensics*. (CO5,L2) 10 Marks
                                                      (or)
b) Illustrate *Financial Fraud in Cyber Domain* with *Case Studies*. (CO5,L2)10 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)- VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University- A.P.- India.)
BIG DATA AND ANALYTICS
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** III
Prerequisites: Python Programming   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand *Bigdata* and its role in *Daily Life*.
2. To know How data is *Stored* and *Processed* in Hadoop.
3. To acquire knowledge on *Modern Databases* used in *Big Data Analytics*.
4. To apply *Visualization of Data* with *Tableau*.
5. To implement *Apache Spark* with *API- SQL and Data Frames*.

Course Outcomes:
Upon successful completion of this course- the student will be able to:
CO1: Understand *Bigdata* and its role in *Daily Life*.
CO2: Know how data is *Stored* and *Processed* in Hadoop.
CO3: Acquire knowledge on *Modern Databases* used in *Big Data Analytics*.
CO4: Apply *Visualization of Data* with *Tableau*.
CO5: Implement *Apache Spark* with *API- SQL and Data Frames*.

UNIT I
Types of Digital Data: Classification of Digital Data.
Introduction to Big Data: Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - What is Big Data? - Other Characteristics of Data - Why Big Data? -Traditional Business Intelligence versus Big Data - Typical Data Warehouse Environment - Typical Hadoop Environment - Coexistence of Big Data and Data Warehouse - What is Changing in the realms of Big Data.

Big Data Analytics: What is Big Data Analytics - What Big Data Analytics is not? - Why this sudden Hype around Big Data Analytics? - Classification of Analytics - Greatest Challenges that Prevent Business from Capitalizing Big Data - Top Challenges facing Big Data - Why Big Data Analytics Important? - What Kind of Technologies are we looking toward to help meet the challenges posed by Big Data? - Data Science - Data Scientist - Terminologies used in Big Data Environments.

UNIT II
Hadoop: Features of Hadoop - Key advantages of Hadoop - Versions of Hadoop - Overview of Hadoop Ecosystem - Hadoop Distributions - Why Hadoop? - Why not RDBMS - RDBMS versus Hadoop - Distribution Computing Challenges - History of Hadoop - Hadoop Overview - Hadoop Distributed File System.
Processing Data with Hadoop: Managing Resource and Applications with Hadoop with YARN (Yet Another Recourse Negotiator) - Interacting with Hadoop Ecosystem.

UNIT III
Introduction to Map Reduce Programming: Introduction - Mapper - Reducer - Combiner - Partitioner - Searching - Sorting – Compression.
NoSQL: Where it is used? - What is it? - Types of NoSQL Databases - Why NoSQL? - Advantages ofNoSQL - What we miss with NoSQL? - Use of NoSQL in Industry - SQL versus NoSQL.

UNIT IV
Hadoop Eco System:
Hive: What is Hive? - Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language (HQL) - RC File Implementation - User Defined Function.

PIG: What is PIG? - Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig - Pig Latin - Data type in Pig - Running Pig - Execution Mode of Pig - HDFS Commands - Relational Operators - Eval Funtions - Complex Data Types - User Defined Functions - Parameter Substitution.
HBase: HBasics - Concepts - Clients - HBase versus RDBMS.

UNIT V

Apache Spark:
Introduction to Apache Spark: A Unified Analytics - What Is Apache Spark? Unified Analytics - The Developer's Experience - Using Scala and PySpark Shell - Understanding Spark Application Concepts - Transformations - Actions and Lazy Evaluation - The Spark UI.
Apache Spark's API: What's Underneath an RDD? - Structuring Spark - The Data Frame API - The Dataset API - Data Frames Versus Datasets - When to Use RDDs - Spark SQL and the Underlying Engine.
Spark SQL and Data Frames: Introduction to built in Data Sources - Using Spark SQL in Spark Applications - SQL Tables and Views - Data Sources for Data Frames and SQL Tables : Data Frame Reader - Data Frame Writer - JSON - CSV- Images - Binary Files.
Common Data Frames and Spark SQL Operations: Unions - Joins - Windowing Spark SQL and Datasets: Working with Datasets: Creating Sample Data - Transforming Sample Data.

Prescribed Text Books			
S.No	Author	Title	Publisher
1	Seema Acharya- Subhashini Chellappan	Big Data and Analytics	Wiley Publications - Second Edition (UNIT I, II, III,IV)
2	Karau H, Konwinski A, Wendell P, Zaharia M	Learning Spark : Lightning Fast Data Analytics	O'Reilley Second Edition (UNIT V: 1 to 6 Chapters)

Reference Text Books			
S.No	Author	Title	Publisher
1	Tom White	Hadoop:The Definitive Guide	O'Reilly, Yahoo Press, Third Edition
2	Bill Chambers & Matei Zaharia	SPARK: The Definitive Guide	O'Reilley, 2018 Edition
3	Guller M	Big data Analytics with Spark: A Practitioner's Guide to using Spark for Large Scale Data Analysis	Apress, 2015

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)-VIJAYAWADA-520010
An Autonomous College in the Jurisdiction of Krishna University- A.P.- India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS THIRD SEMESTER
21DS3T3 -BIG DATA AND ANALYTICS
SYLLABUS W.E.F 2021-2022

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

1.
a) Define Big Data (CO1,L1)
b) Define Analytics. (CO1,L1)
c) Label the difference between RDBMS and Hadoop. (CO2,L1)
d) List the Key Components of Yarn? (CO2,L1)
e) What is Hadoop Map Reduce? (CO3,L1)
f) List the types of NoSQL Databases(CO3,L1)
g) List the data types for Hive. (CO4,L1)
h) How   HBase differs with RDBMS (CO4,L1)
i) What is Apache Spark? (CO5,L1)
j) Define JSON. (CO5,L1)

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

UNIT I
2. a. Explain the *Digital data* with examples. (CO1,L2) 5Marks
   a. Summarize the challenges faced by *Bigdata.* (CO1,L2) 5 Marks
                                          (or)
   b. Explain *Brewers Theorem* with examples. (CO1,L2) 5 Marks
   c. Explain the *In-memory Analytics.* (CO1,L2) 5 Marks

UNIT II
3. a. Explain *Hadoop Eco System* with neat diagram. (CO2,L2) 10 Marks
                                          (or)
   b. Explain *HDFS File Systems* with neat diagram. (CO2,L2)10 Marks

UNIT III
4. a. Explain *Map Reduce* in hadoop with example. (CO3,L2) 10 Marks
                                          (or)
   b. Demonstrate *File Read* and *File Write* in hadoop. (CO3,L2) 10 Marks

UNIT IV
5. a. Explain *Hive Architecture* with neat diagram. (CO4,L2) 10 Marks
                                          (or)
   b. Explain *CRUD Operations* in *MongoDB* with examples. (CO4,L2) 5 Marks
   c. Explain mongoDB *import* and *export* with examples. (CO4,L2) 5 Marks

UNIT V
6. a. Explain TDD in *Apache Spark* with examples. (CO5,L2) 10 Marks
                                          (or)
   b. Explain *Common Data Frames* and Distinguish between *Data Frames* Vs
      Datasets. (CO5,L2) 5 Marks
c. Explain *Spark SQL Operations* in Spark. (CO5,L2) 5 Marks

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
BLOCK CHAIN TECHNOLOGY
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** III
Prerequisites: Cryptography and Network Security   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand basic concepts of *Blockchain & Limitations*.
2. To learn *How Bitcoin Achieves Decentralization*.
3. To familiar with *How to Store Bitcoins* and *How to Use Bitcoins*.
4. To know *Ethereum and Smart Contracts* and *Blockchain Applications*.
5. To gain knowledge on *Mining Consensus* and *Bitcoin Security.*

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understands basic concepts of *Blockchain & Limitations*.
CO2: Learn *How Bitcoin Achieves Decentralization*.
CO3: Familiar with *How to Store Bitcoins* and *How to Use Bitcoins*.
CO4: Know *Ethereum and Smart Contracts* and *Blockchain Applications*.
CO5: To gain knowledge on *Mining Consensus* and *Bitcoin Security.*

UNIT I
Why Blockchain is Need: Discovering the Core Problem - Public Ledgers - Block in Blockchain - Public versus Private Blockchain.
How Blockchain Works: Planning the Blockchain - 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.

UNIT II
How Bitcoin Achieves Decentralization: Centralized versus Decentralization - Distributed Consensus - Bitcoin Transactions - Bitcoin Scripts - Applications of Bitcoin Scripts - Bitcoin Blocks.

UNIT III
How to Store Bitcoins: Simple Local Storage - Hot and Cold Storage - Splitting and Sharing Keys.
How to Use Bitcoins: Online Wallets and Exchanges - Payment Services - Transaction Fees - Currency Exchange Markets.
UNIT IV
Ethereum and Smart Contracts: Smart Contract Programming Model, Namecoin in Ethereum, Gas Incentives and Security, Data Structures in Ethereum.
Blockchain Applications: Applications from Building Blocks, Colored Coins, Counterparty, Payment Channels and State Channels, Routed Payment Channels.

UNIT 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.

Bitcoin Security: Security Principles - User Security Best Practices.

	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

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

1. a) What is reinventing the Block Chain?(CO1,L1)
    b) How to use Data Store? (CO1,L1)
    c) What is Block in Block Chain? (CO2,L1)
    d) What is Script? (CO2,L1)
    e) What is Splitting? (CO3,L1)
    f) What is Transaction? (CO3,L1)
    g) What is Payment Channel? (CO4,L1)
    h) What is Colored Coin? (CO4,L1)
    i) What is Mining Node? (CO5,L1)
    j) List Security Principles (CO5,L1)

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

2. (a) What are Public Ledgers? Explain Public & Private Blockchains. (CO1,L1) 10 Marks
                                    (or)
   (b) How to identify and protect User Accounts and Authorize Transactions? (CO1,L1) 10 Marks

3. (a) Differentiate Centralized & Decentralized in Bitcoin.(CO2,L2) 10 Marks
                                    (or)
   (b) Explain Bitcoin Scripts and their Applications. (CO2,L2) 10 Marks

1.   (a) What are Hot & Cold Storages? Explain in detail. (CO3,L1)10 Marks
                                    (or)
       (b) How bitcoins are used in online Wallets & Exchanges and payment services? (CO3,L1) 10 Marks

2.   (a) Explain Smart Contract Programming Model & Data Structures in Ethereum. (CO4,L2) 10 Marks
                                    (or)
   (b) Write about Applications from Building Blocks and Colored Coins. (CO4,L2) 10 Marks

3. (a) Explain Mining, Validating, Assembling and Selecting Chains of blocks. (CO5,L2) 10 Marks
                                    (or)
   (b) Explain the Security Principles in Bitcoin Security. (CO5,L2) 10 Marks

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
DEEP LEARNING
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:**4 **Semester:** III
Prerequisites: Python Programming,Machine Leaning**Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation:30   **Semester end Evaluation:**70   **Total Marks:**100

Course Objectives:
1. To illustrate Basics of Deep Leaning.
2. To understand the concepts of Memory Augmented Neural Networks.
3. To summarize Deep Reinforcement Learning.
4. To implement Neural Networks in Tensor Flow
5. To identify the Applications of Deep Learning.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Illustrate Basics of Deep Learning.(PO1,PO5)
CO2: Understand the concepts of Memory Augmented Neural Networks. (PO1,PO5)
CO3: Summarize Deep Reinforcement Learning. (PO1,PO7)
CO4: Implement Neural Networks in Tensor Flow. (PO1,PO3,PO7)
CO5: identify the Applications of Deep Learning. (PO1, PO3)

CO-PO MATRIX								
COURSE CODE	**CO-PO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
	CO1	H				L		
	CO2	H				L		
	CO3	H						**L**
	CO4	H		M				**L**
	CO5	H		M				

UNIT I
Basics of Deep Leaning- Deep learning architectures: Convolutional Neural Networks : Neurons in Human Vision - The Shortcomings of Feature Selection - Vanilla Deep Neural Networks Don't Scale - Filters and Feature Maps - Full Description of the Convolutional Layer - Max Pooling - Full Architectural Description of Convolution Networks - Closing the Loop on MNIST with Convolutional Networks - Image Preprocessing Pipelines Enable More Robust Models - Accelerating Training with Batch Normalization -Building a Convolutional Network for CIFAR 10 - Visualizing Learning in Convolutional Networks - Leveraging

Convolutional Filters to Replicate Artistic Styles - Learning Convolutional Filters for Other Problem Domains - Training algorithms.

UNIT II

Memory Augmented Neural Networks: Neural Turing Machines - Attention Based Memory Access - NTM Memory Addressing Mechanisms - Differentiable Neural Computers - Interference Free Writing in DNCs- DNC Memory Reuse - Temporal Linking of DNC Writes - Understanding the DNC Read Head - The DNC Controller Network - Visualizing the DNC in Action-Implementing the DNC in Tensor Flow - Teaching a DNC to Read and Comprehend.

UNIT III

Deep Reinforcement Learning: Deep Reinforcement Learning Masters Atari Games - What Is Reinforcement Learning? - Markov Decision Processes (MDP) - Explore Versus Exploit - Policy versus Value Learning - Pole Cart with Policy Gradients- Q Learning and Deep Q Networks - Improving and Moving Beyond DQN.

UNIT IV

Implementing Neural Networks in Tensor Flow: What Is Tensor Flow? - How Does Tensor Flow Compare to Alternatives? - Installing Tensor Flow - Creating and Manipulating Tensor Flow Variables - Tensor Flow Operations-Placeholder Tensors-Sessions in Tensor Flow - Navigating Variable Scopes and Sharing Variables - Managing Models over the CPU and GPU - Specifying the Logistic Regression Model in Tensor Flow - Logging and Training the Logistic Regression Model.

UNIT V

Applications: Large Scale Deep Learning - Computer Vision - Speech Reorganization - Natural Language Processing - Other Applications.

Prescribed Text Books			
	Author	Title	Publisher
1	Nikhil Buduma, Nicholas Locascio	Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms.	O'Reilly Media, 2017
2	Ian Goodfellow, YoshuaBengio, Aaron Courville	Deep Learning (Adaptive Computation and Machine Learning series).	MIT Press, 2017

Reference Text Books			
	Author	Title	Publisher
1	DouweOsinga	Deep learning Cook Book, Practical Recipes to Get Started Quickly	O'Reilly

e-Resources: 1) https://keras.io/datasets/ 2) http://deeplearning.net/tutorial/deeplearning.pdf 3) https://arxiv.org/pdf/1404.7828v4.pdf 4) https://github.com/lisa-lab/DeepLearningTutorials

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
DATA VISUALIZATION LAB
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Practical   **Credits:** 3   **Semester:** IV
Prerequisites: Excel, Tableau   **Lecture-Tutorial-Practice:** 0-0-6
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To implement *Tableau Installation*, *Introduction*, *Exploring*.
2. To implement *Data Blending*.
3. To implement *Uni-variate Charts*, *Bi-variate Charts*, *Multi-variate Charts*.
4. To implement *Trend Line*, *Word cloud, Bubble Chart.*
5. 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.*

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:

15. Data Munging in Power BI. (CO5, L3)

16. Importing Graphs in to power BI. (CO5, L3)

17. Group and Aggregate Data in Power BI. (CO5, L3)

18. Create a *Dash Board* in *Power BI.* (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.

COURSE	COURSE CODE	L	T	P	C	Year
PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA	21DSM1	4	-	-	4	2020-21

Course Outcomes:-

CO1: List the main categories of online social media threats.(PO1)(PO4)(PO5)(PO7)

CO2. Explain the difference between misinformation and privacy concerns on social media.

(PO1)(PO3)(PO4)(PO6)(PO7)

CO3. Identify tools for data collection on OSM and evaluate their trustworthiness.

(PO1)(PO2)(PO3)(PO6)(PO7)

CO4. Differentiate between link farming and semantic attacks on social media platforms

(PO1)(PO3)(PO4)

CO5. Assess the impact of username changes on user anonymity in social networks.(PO3)(PO4)(PO7)

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO1	M			M	L		L
COURSE CODE	CO2	M		M	H		L	L
	CO3	H	M	M			L	L
	CO4	H		H	M			
	CO5			H	H			M

UNIT-1

Introduction-Incidents-OSM APIs and tools for data collection-Trust and Credibility on OSM.

UNIT-2

Misinformation on Social Media-Privacy and Social Media-Privacy and Pictures on Online Social Media.

UNIT-3

Policing and Online Social Media Part-I-Policing and Online Social Media Part-II-Policing and Online Social Media Part-III-eCrime on Online Social Media Part-I-eCrime on Online Social Media Part-II.

UNIT-4

Link Farming in Online Social Media-Nudges-Semantic attacks: Spear phishing-Profile Linking on Online Social Media-Anonymous Networks.

UNIT-5

Privacy in Location Based Social Networks Part-I-Privacy in Location Based Social Networks Part-II-Beware of What You Share Inferring Home Location in Social Networks-On the dynamics of username change behavior on Twitter.

Prescribed Text Book			
	Author	Title	Publisher
		Social Media: Understanding the Power of Connections	
1	P. Neis and N. Zipf	OpenStreetMap: Using and Contributing to the Free Map of the World	O'Reilly Media

Reference Text Book			
	Author	Title	Publisher
1	Roger Dingledine, Roger J. Feldman, and Bruce Hayes	Anonymous Networks: Decentralizing the Internet	Morgan Kaufmann Publishers

Programme: M.Sc(DS)

Title of the Paper: Project work

Semester: IV

Course Code	21DS4P1	CIA Marks	100
Credits	8	Semester End Exam Marks	100
No. of Practical Hours / Week	16	Total Marks	200

Course Outcomes
After completion of the course student will be able to
1 Recall advanced theoretical and practical knowledge to develop data-driven applications. (PO1)
2 Demonstrate proficiency in programming, data analysis, and machine learning techniques. (PO3)
3 Solve complex technical problems using critical thinking and data insights. (PO3)
4 Analyze project requirements to manage projects efficiently while ensuring ethical standards and best practices.(PO2),(PO4)
6 Combine effectively and communicate technical findings to diverse audiences.(PO6)

CO-PO MATRIX								
	CO-PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
20CA4P1	CO1	H	M		L		M	
	CO2	H		H		H		M
	CO3	H	M					
	CO4		H	H				
	CO6			M				H

The project will be assigned in the final semester. The project will be performed at the established industry (or) in the department under the supervision of the faculty or research institutes. It may involve experimental and/or theoretical work as well as critical review of the literature. Each of the students has

to carry out original research in a topic in accordance with the work chosen under the guidance and supervision of a teacher in the concerned Department of the college.

Dissertation must be submitted at the end of the semester which will be assessed by the external examiners. Dissertation must be prepared with introduction, Review of the literature, Experimental Session, Results and Discussion, Conclusion and References.
The final dissertation should have at least 40 – 60 pages typed in Times New Roman 12 font except Headings and side headings with 1.5 line spacing.

PROJECT WORK

- All the candidates shall undertake a Project Work of **three months duration** in the fourth semester. The project should have industry orientation and the work should be certified by the concerned organization where the student has undertaken the project work. The project work shall be guided and certified by the teacher-guide.

- The purpose of the project work is primarily to demonstrate the application of knowledge of skills acquired in the MCA programme, by studying and analyzing a selected problem in the work situation in a systematic manner while suggesting solution. Each student is required to study the problem under the guidance of a faculty member of the department.

- The completed project should be submitted to the College as per the guidelines prescribed by the Examination Section from time to time.

- Internal assessment of project work will be done by the concerned project internal guide and HOD for 50 marks. External evaluation will be carried out by a committee consisting of project internal guide, HOD and the external examiner appointed by the Controller of Examinations for 150 Marks.

Evaluation Schema for Continuous **Internal / External** Assessment of Project Work		
Review-I	Submission of Abstract	25/25 Marks
Review-II	Submission of Data Dictionary & UML/ER Diagrams	25/25 Marks
Review-III	Project Execution	25/25 Marks
Thesis Submission		25/25 Marks
Total		100/100 Marks

- The Candidate should have to secure minimum 50% marks in Project work.

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DATA VISUALIZATION
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** IV
Prerequisites: Python Programming   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100

Course Objectives:
1. To understand *Basics of Tableau*, *Visual Design and Connecting various Data Sources*.
2. To know *Uni-variate Charts***,** *Bi-variate Charts***,** *Multi-variate Charts, Interacting with the Viewer.*
3. To create *Tableau Maps* and *Creating Dashboards and Stories*.
4. To implement *Data Operations* of *Power BI.*
5. To implement *Power Pivot Model* and *Power BI Environment.*

Course Outcomes:
On successful completion of this course, the students able to:
CO1: Understand *Basics of Tableau*, *Visual Design and Connecting various Data Sources*.
CO2: Know *Uni-variate Charts***,** *Bi-variate Charts***,** *Multi-variate Charts*, *Interacting with the Viewer.*
CO3: Create *Tableau Maps* and *Creating Dashboards and Stories*.
CO4: To implement *Data Operations* of *Power BI.*
CO5: To implement *Power Pivot Model* and *Power BI Environment.*

UNIT I (12 Hours)
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.

UNIT II (12 Hours)
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.

UNIT III(12 Hours)
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.

UNIT IV (12 Hours)

Introduction Power Pivot:
Introduction of Pivot: Use Power Pivot - xVelocity in Memory Analytics Engine - Exploring the Data Model Management Interface - Analyzing Data Using a Pivot Table.
Data Operations:
Working with Data: Import Data from Relational Databases - Import Data from Text Files - Import Data from a Data Feed - Import data from an OLAP cube.
Power BI Data Munging (Query): Discover and import data from various Sources - Getting, Cleaning and Shaping Data - Creating Table Relationships, Data, Merge, Shape, and Filter Data - Group and Aggregate Data - Insert Calculated Columns.

UNIT V(12 Hours)

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 - Understand when and how to de-normalize the Data, Create and use Linked Tables.
Power BI:
Power BI Environment: Adding Calculations and Measures - Importing Graphs - User Graphs, Dash boards- Incorporating Time Based Analysis.

	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

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VIJAYAWADA-520010
(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
FOURTH SEMESTER
DATA VISUALIZATION
SYLLABUS W.E.F 2021-2022

Time: 3 Hours   **Max. Marks: 70**
   Answer ALL questions   **(10×2 = 20 Marks)**
   1. a) What is *Tableau*? (CO1,L1)
   b) How do you change *Data Type* in Tableau. (CO1,L1)
   c) What is *Tree Map*? (CO2,L1)
   d) What is *Quick Filter*? (CO2,L1)
   e) Name any two *Web Map Services*. (CO3,L1)
   f) Name any two features of *Supplementary Dashboard*. (CO3,L1)
   g) What is *Pivot Table*? (CO4,L1)
   h) What is *Data Munging*? (CO4,L1)
   i) What is *Star Schema*? (CO5,L1)
   j) What are the advantages of *Time Based Analysis*? (CO5,L1)

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

UNIT I
2 a. Explain *Shape and Label Options* and *Formatting Options* in *Tableau*. (CO1,L2) 10 Marks
                                           (or)
   b. Illustrate how data sources connected to *Tableau*. (CO1,L2) 10 Marks

UNIT II
3   a. Build Uni-variate charts. (CO2,L3) 10 Marks
                                           (or)
   c. Experiment with *Basic Filters* and *Quick Filters*. (CO2,L3) 10 Marks

UNIT III
4   a. Compare any two types of *Tableau Maps*. (CO3,L4) 10 Marks
                                           (or)
   b. Examine the procedure to create Simple Dashboard. (CO3,L4) 10 Marks

UNIT IV
5   a. Explain how to Analyze Data using a Pivot Table. (CO4,L5) 10 Marks
                                           (or)
   c. Explain how to import data from various sources. (CO4,L5) 10 Marks

UNIT V
6 a. Create Relationships between Tables in the Model (CO5, L6) 10 Marks
                                           (or)
   b. Discuss how to import Graphs in Power BI. (CO5, L6) 10 Marks

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
BUSINESS ANALYTICS
SYLLABUS W.E.F 2021-2022
Course Category: Programme Core   **Course Type:** Theory   **Credits:** 4   **Semester:** IV
Prerequisites: Statistical Techniques   **Lecture-Tutorial-Practice:** 4-0-0
Continuous Evaluation: 30   **Semester end Evaluation:** 70   **Total Marks:** 100
Year of Introduction: 2021 **Percentage of Change:** Nil

Course Objectives:
1. To learn overview of *Big Data Analytics*.
2. To understand and implement *MongoDB* and *MapReduce*.
3. To understand analyze *Descriptive* and *Predictive Analysis*.
4. To understand *Prescriptive Analytics*.
5. To understand and implement *Emerging Trends* and *Future Impacts*.

Course Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Learn overview of *Big Data Analytics*.
CO2: Understand and implement *MongoDB* and *MapReduce*.
CO3: Understand analyze *Descriptive* and *Predictive Analysis*.
CO4: Understand *Prescriptive Analytics*.
CO5: Understand and implement *Emerging Trends* and *Future Impacts*.

UNIT I (12 Hours)
Big Data Analytics:
Types of Digital Data (Structured, Unstructured and Semi-structured Data) - Big data from Business Perspective (Introduction of Big data, Characteristics of Big data, Data in the Warehouse, Importance of Big data) - Big data Use Cases (Patterns for Big Data Deployment, Big data Market Survey).

UNIT II (12 Hours)
Introduction to MongoDB and MapReduce Programming
MongoDB: Why MongoDB - Terms used in RDBMS and MongoDB - Data Types - MongoDB Query Language
MapReduce: Mapper - Reducer - Combiner - Partitioner - Searching - Sorting - Compression.

UNIT III (12 Hours)
Business Analytics- Descriptive and Predictive Analytics
Introduction Business Analytics: What and Why Business Analytics - Business Analytics Importance.
Descriptive Analytics: Data Warehousing - Business Reporting - Visual Analytics - Business Performance Management.
Predictive Analytics: Techniques for Predictive Modeling - Web Analytics - Web Mining - Social Analytics - Case Study.

UNIT IV (12 Hours)
Business Analytics- Prescriptive Analytics
Prescriptive Analytics: Case Study – Model Based Decision Making (Optimization and Multi-Criteria Systems).
Modeling and Analysis: Heuristic Search Methods and Simulation - Case Study.

UNIT V (12 Hours)

Business Analytics: Emerging Trends and Future Impacts

Opening Vignette - Location Based Analytics for Organizations - Analytics Applications for Consumers - Web 2.0 - Online Social Networking - Cloud Computing and Bl - Impacts of Analytics in Organizations - Analytics Ecosystem.

Prescribed Text Book			
S.No.	Author	Title	Publisher
1	MarcJ.Schniederjans,DaraG.Schniederjans,ChristopherM.Starkey	Business Analytics Principles, Concepts, and Applications	Pearson.2014.
2	R.Sharada,D Delen	Business Intelligence and Analytics	E. Turbon-Tenth Edition.
3	R.N.Prasad & Seema Acharya	Fundamentals of Business Analytics	Wiley Publications, 2nd Edition, 2016

Reference Text Book			
S.No.	Author	Title	Publisher
1	Frank J Ohlhorst	Big Data Analytics: Turning Big Data into Big Money	WileyandSASBusinessSeries,2012

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(An Autonomous College in the Jurisdiction of Krishna University, A.P., India.)
M.Sc.,(DATA SCIENCE) DEGREE EXAMINATIONS
FORTH SEMESTER
BUSINESS ANALYTICS
SYLLABUS W.E.F 2021-2022

Time: 3 Hours   **Max. Marks: 70**
   Answer ALL questions   **(10×2 = 20 Marks)**
  1.a) What is *Structured Data*? (CO1,L1)
   b) Write about Warehouse. (CO1,L1)
   c) What is the Purpose of *RDBMS*? (CO2,L1)
   d) What is *Data Type*? (CO2,L1)
   e) What is *Business Analytics*? (CO3,L1)
   f) What is *a Visualization?* (CO3,L1)
   g) What is *a Model?* (CO4,L1)
   h) State *Perspective Analysis*. (CO4,L1)
   i) What is *Web 2.0?* (CO5,L1)
   j) State the impact of *ADS system*. (CO5,L1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks.   **(5×10 = 50 Marks)**
UNIT- I
2. a) Explain the characteristics of Big Data and Why Big Data is important ? (CO1,L2) 10 Marks
                              (or)
   b) Explain *the Classification of Analytics*. (CO1,L2) 10 Marks

UNIT- II
3. a) List *various methods in MongoDb*. (CO2,L4) 10 Marks
                              (or)
   b) Analyze *Parallel Breadth-First Search*. (CO2,L4) 10 Marks

UNIT-III
4. a) Apply *Business reporting and Visual Analytics for any organization.*(CO3,L3) 10 Marks
                              (or)
    b) Identify and explain difference between *Web and Social Analytics*.(CO3,L3) 10 Marks

UNIT-IV
5. a) Illustrate *Structure Of Mathematical Models For Decision Support*. (CO4,L5) 10 Marks
                              (or)
   b). Explain *Genetic Algorithm.* (CO4,L5) 10 Marks

UNIT-V
6. a) Discuss *Cloud Computing* and *BI* (CO5,L6) 10 Marks
                              (or)
   b) Discuss *Analytics Ecosystem*. (CO5,L6) 10 Marks