



**PARVATHANENI BRAHMAYYA  
SIDDHARTHA COLLEGE OF ARTS & SCIENCE**

Siddhartha Nagar, VIJAYAWADA - 520 010, Andhra Pradesh  
Autonomous, NAAC A+ Grade, ISO Certified Institution



**NAAC - SSR IV CYCLE**

**M.Sc. COMPUTER SCIENCE**

**REGULATION 20**

**2020-22**

**PROGRAMME STRUCTURE &**

**SYLLABUS**

Parvathaneni Brahmayya Siddhartha College of Arts & Science: Vijayawada-10

(An Autonomous college in the jurisdiction of Krishna University)

Accredited at A+ grade by NAAC

**2020 Batch M.Sc- Computer Science**

**List of Courses**

<b>C CODE</b>	<b>COURSE TITLE</b>	<b>CREDITS</b>	<b>TOTAL</b>	<b>CIA</b>	<b>SEE</b>
<b>MAY -2021 FIRST SEMESTER</b>					
20CS1T1	PROBLEM SOLVING USING PYTHON PROGRAMMING	4	100	30	70
20CS1T2	COMPUTER ORGANIZATION	4	100	30	70
20CS1T3	SOFTWARE ENGINEERING	4	100	30	70
20CS1T4	DATABASE MANAGEMENT SYSTEMS	4	100	30	70
20CS1T5	THEORY OF COMPUTATION	4	100	30	70
20CS1L1	PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	4	100	30	70
20CS1L2	DBMS LAB	4	100	30	70
20CS1S1	SEMINAR	1	50	50	-
<b>TOTAL</b>		<b>29</b>	<b>750</b>	<b>260</b>	<b>490</b>
<b>OCTOBER-2021 SECOND SEMESTER</b>					
20CS2T1	COMPUTER NETWORKS	4	100	30	70
20CS2T2	DATA STRUCTURES	4	100	30	70
20CS2T3	WEB TECHNOLOGIES	4	100	30	70
20CS2T4	OPERATING SYSTEMS	4	100	30	70
20CS2T5	TECHNICAL REPORT WRITING	1	50	50	-
20CS2L1	COMPUTER NETWORKS & OPERATING SYSTEMS LAB	4	100	30	70
20CS2L2	DATA STRUCTURES LAB	4	100	30	70
<b>20OE02</b>	<b>COMPUTATIONAL MATHEMATICS (OPEN ELECTIVE)</b>	<b>4</b>	<b>100</b>	<b>30</b>	<b>70</b>
<b>TOTAL</b>		<b>25</b>	<b>650</b>	<b>230</b>	<b>420</b>

<b>MARCH-2022 THIRD SEMESTER</b>					
20CS3T1	INTERNET OF THINGS (IOT)	4	100	30	70
20CS3T2	CRYPTOGRAPHY & NETWORK SECURITY	4	100	30	70
20CS3T3	DESIGN & ANALYSIS OF ALGORITHMS	4	100	30	70
20CS3T4	DATA MINING TECHNIQUES	4	100	30	70
20CS3L1	WEB TECHNOLOGIES LAB	4	100	30	70
20CS3L2	DATA MINING LAB	4	100	30	70
<b>20OE05</b>	<b>ENGLISH PRESENTATION &amp; SOFT SKILLS (OPEN ELECTIVE)</b>	<b>4</b>	<b>100</b>	<b>30</b>	<b>70</b>
<b>TOTAL</b>		<b>24</b>	<b>600</b>	<b>180</b>	<b>420</b>
<b>JULY-2022 FOURTH SEMESTER</b>					
20CS4T1	BIG DATA & ANALYTICS	4	100	30	70
20CS4T2	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	4	100	30	70
20CS4T3	CLOUD COMPUTING	4	100	30	70
20CS4L1	BIG DATA & ANALYTICS LAB	4	100	30	70
20CS4M1	BLOCK CHAIN AND ITS APPLICATIONS (MOOCS)	4	100	30	70
20CS4P1	PROJECT WORK	8	200	100	100
<b>TOTAL</b>		<b>28</b>	<b>700</b>	<b>250</b>	<b>450</b>

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

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

**Course Outcomes:**

On successful completion of this course, the students:

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

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

If income is less than 1,50,000 then no tax

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

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

MIN1 = 150001

MAX1= 300000

RATE1 = 0.10

MIN2 = 300001

MAX2=500000

RATE2=0.20

MIN3=500001

RATE3=0.30

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

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

COURSE	COURSE CODE	L	T	P	C	Year
DBMS LAB	CS1L2	-	-	6	3	2020-21

**Course Outcomes:**

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

1. Create database using DDL commands. (CO1)
2. Retrieve data from database using DML for a given situation. (CO2)
3. Familiarize with a query language through basic SQL queries. (CO3)
4. Experiment Nested query, Joins, Integrity Constraints and Views in database. (CO4)
5. Demonstrate trigger, function and procedure using PL/SQL. (CO5)

**CYCLE-I**

Aim: Marketing Company wishes to computerize their operations by using following tables.(BTL3)

Table Name: Client- Master			
Column Name	Data Type	Size	Attribute
CLIENT_NO	Varchar2	6	Primary key and first letter must start with
NAME	Varchar2	20	Not null
ADDRESS 1	Varchar2	30	
ADDRESS S	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
BAL_DUE	Number	10,2	

Table Name: Product_ Master			
Column Name	Data Type	Size	Attribute
PRODUCT_NO	Varchar2	6	Primary key and first letter must start with
DESCRIPTION	Varchar2	15	Not null
PROFIT_PERCENT	Number	4,2	Not null
UNIT_MEASUE	Varchar2	10	
QTY_ON_HAND	Number	8	
REORDER_LVL	Number	8	
SELL_PRICE	Number	8, 2	Not null, cannot be 0
COST_PRICE	Number	8,2	Not null, cannot be 0

Table Name: Salesman_ Master			
Column Name	Data Type	Size	Attribute
SALESMAN_NO	Varchar2	6	Primary key and first letter must start with 'S'
SALESMAN_NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	

ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	
STATE	Vachar2	20	
SAL_AMT	Number	8,2	Not null, cannot be 0
TGT_TO_GET	Number	6,2	Not null, cannot be 0
YTD_SALES	Number	6,2	Not null
REMARKS	Varchar2	20	

Table Name: Sales_Order			
Column Name	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primary key and first letter must start with 'S'
CLIENT_NO	Varchar2	6	Foreign Key
ORDER_DATE	Date		
DELY_ADDRESS	Varchar2	25	
SALESMAN_NO	Varchar2	6	Foreign Key
DELY_TYPE	Char	1	Delivery: part(p)/ full(f) and default 'F'
BILL_YN	Char	1	
DELY_DATE	Date		Can't be less than order date
ORDER_STATUS	Varchar2	10	Values ("In Process", "Fulfilled",

Table Name: Sales_Order_Details			
Column Name	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primary key references SALES_ORDER table
PRODUCT_NO	Varchar2	6	Foreign Key references SALES_ORDER table
QTY_ORDERED	Number	8	
QTY_DISP	Number	8	
PRODUCT_RATE	Number	10,2	Foreign Key

Solve the following queries by using above tables. (BTL3)

1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product\_master table.
4. Find the names of sales man who have a salary equal to Rs.3000.
5. List the names of all clients having 'a' as the second letter in their names.
6. List all clients whose Bal due is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.
11. Find the products in the sorted order of their description.
12. Find the products with description as '540HDD' and 'Pen drive'.
13. Count the total number of orders.
14. Print the description and total qty sold for each product.
15. Calculate the average qty sold for each client that has a maximum order value of 15,000.
16. Find all the products whose quantity on hand is less than reorder level.
17. List the order number and day on which clients placed their order.
18. Find out the products and their quantities that will have to deliver in the current month.
19. Find the names of clients who have placed orders worth of 10000 or more.

20. Find the client names who have placed orders before the month of June,2018.

### CYCLE-II

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows. (BTL3)

Supplier (Supplier\_No, Sname, City, status)

Part( Part\_no, pname, color, weight, city, cost)

Shipment (supplier\_No, Part\_no, city)

JX( project\_no, project\_name, city)

SPJX (Supplier\_no, part\_no, project\_no, city)

Solve the following queries by using above tables. (BTL3)

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

### CYCLE-III

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into a certain departments and each department consists of employees. The following two tables describes the automation schemas. (BTL3) (BTL4)

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

Dept(Deptno, Dname, Loc)

Solve the following queries by using above tables. (BTL3)

1. List the details of employees who have joined before the end of September '81.
2. List the name of the employee and designation of the employee, who does not report to anybody.
3. List the name, salary and PF amount of all the employees (PF is calculated as 10% of salary)
4. List the names of employees who are more than 2 years old in the organization.
5. Determine the number of employees, who are taking commission.
6. Update the employee salary by 20% , whose experience is greater than 12 years.
7. Determine the department does not contain any employees.
8. Create a view, which contains employee name and their manager names working in sales department.
9. Determine the employees, whose total salary is like the minimum salary of any department.
10. List the department numbers and number of employees in each department.
11. Determine the employees, whose total salary is like the minimum salary of any department.
12. List average salary for all departments employing more than five people.
13. Determine the names of employees, who take highest salary in their departments.
14. Determine the names of employees, who earn more than their managers.
15. Display ename, dname, even if no employee belongs to that department (use outer join).



## CYCLE-IV

An Airline system would like to keep track their information by using the following relations. (BTL3)

FLIGHTS( fl\_no: integer, from: string, to: string, distance: integer, price: integer)

AIRCRAFT(aid: integer, aname: string, cruising\_range: integer)

CERTIFIED(eid: integer, aid: integer)

Employees( eid: integer, ename: string, salary: real)

Note that the employees relation describes pilots and other kinds of employees as well; every pilot is certified for aircraft and only pilots are certified to fly. Resolve the following queries. (BTL3) (BTL4)

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

## PL/SQL PROGRAMS (BTL3) (BTL4)

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

Table used: Elect

Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)

PREV_READ		NUMBER(5)
NO_UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

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

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

15. Write a PL/SQL program to raise the employee salary by 10 %, who are completed their 25 years of service and store the details at appropriate tables (Define the Retair\_Emp\_Table) .
16. Write a PL/SQL program to evaluate the grade of a student with following conditions:

For pass: all marks > 40

For I class: Total % > 59

For II Class: Total % between >40 and < 60

For III class: total % = 40

And also maintain the details in abstract table.

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

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

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

COURSE	COURSE CODE	L	T	P	C	Year
SEMINARS	20CS1S1	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)

<b>CO-PO MATRIX</b>								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>20CS1S1</b>	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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COURSE	COURSE CODE	L	T	P	C	Year
PROBLEM SOLVING USING PYTHON PROGRAMMING	20CS1T1	4	-	-	4	2020-21

**Course Outcomes:**

On successful completion of this course, the students:

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

**UNIT I**

**Basics of Python Programming:** Features of Python, History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion.

**UNIT II**

**Decision Control Statements:** Conditional Branching Statements, Basic Loop Structures, Nested Loops, The Break Statement, The Continue Statement, The Pass Statement. The Else Statement used with Loops.

**Functions and Modules:** Function Definition, Function Call, Variable Scope and Lifetime, The Return Statement, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Standard Library Modules.

**UNIT III**

**Python Strings Revisited:** Concatenating, Appending and Multiplying Strings, String Formatting Operator, Built in String Methods and Functions, Comparing Strings, Regular Expressions.

**Data Structures:** Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.

**UNIT IV**

**Classes and Objects:** Classes and Objects, Class Method and self Argument, Class Variables and Object Variables, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Class Attributes, Class Methods, Static Methods.

## UNIT V

**Inheritance:** Inheriting Classes in Python, Types of Inheritance, Abstract Classes and Interfaces.

**Error and Exception Handling:** Introduction to Errors and Exceptions, Handling Exceptions, Raising Exceptions, Built-in and User defined Exceptions

**Operator Overloading:** Concept of Operator Overloading, Advantage of Operator Overloading, Implementing Operator Overloading.

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

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



UNIT – V

6. A) Explain *Different Types of Inheritance* in Python with suitable examples.  
(OR)  
B) Explain any *Three Built-in Exceptions* with relevant examples.

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

**Course Outcomes:**

On successful completion of this course, the students:

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

**UNIT I**

**Digital Logic Circuits:** Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

**Digital Components:** Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.

**Data Representation:** Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Error Detection Codes.

**UNIT II**

**Register Transfer and Micro Operations:** Register Transfer Language, Register Transfer, Bus & Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

**Basic Computer Organization and Design:** Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory-Reference Instructions, Input-Output Interrupt.

**UNIT III**

**Micro Programmed Control:** Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

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



#### UNIT IV

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

#### UNIT V

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt.

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory.

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

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

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**Course Code: 20CS1T2**

**Title: COMPUTER ORGANIZATION**

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

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

1. a) State any two *Logic Gates with Truth Tables*.
- b) Find the *Binary Number ( ? )<sub>2</sub>* to *Hexadecimal Number (1C)<sub>16</sub>*
- c) What is *Register Transfer*?
- d) What is *Accumulator* ?
- e) What is *Address Sequencing* ?
- f) Give details of *Stack Organization*.
- g) What is *BCD Adder* ?
- h) Perform *Binary Multiplication* for the decimal numbers 23 and 19.
- i) What is the difference between *Isolated* and *Memory Mapped I/O*?
- j) What is *Priority Interrupt* ?

**Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**(5×10 = 50 Marks)**

UNIT – I

2. A) What is *Flip flop*? Explain *different types of Flip flops* in detail.  
(OR)  
B) Explain the *Fixed Point Representation* with an example.

UNIT – II

3. A) Explain *Logic Micro Operations* in detail.  
(OR)  
B) What is *Instruction Cycle*? Explain various phases of *Instruction Cycle*.

UNIT – III

4. A) Describe the design of *Control Unit*.  
(OR)  
B) Explain various *Addressing Modes*.

UNIT – IV

5. A) What is *BCD Added* ? Explain in detail.  
(OR)  
B) Explain *Booth's Multiplication Algorithm* with example.

UNIT – V

6. A) Explain different *Modes of Data Transfers*.  
(OR)  
B) What is *Cache Memory*? Discuss various *Mapping Procedures* of *Cache Memory*.

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

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

**Course Outcomes:**

On successful completion of this course, the students:

- CO1. Understand Software Engineering and Agile Strategies. (PO1)(PO2)(PO4)
- CO2. Choose *Core Principles, Requirements & Modelling Concepts*. PO1)(PO2)(PO4)(PO5)
- CO3. Compare Software Testing Approaches and Quality Assurance Aspects. PO1)(PO2)
- CO4. Classify various *Process & Project Management Concepts*. PO1)(PO2)
- CO5. Estimate *Software Projects & apply Formal Methods Modelling*. PO1)(PO2)(PO4)

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>20CS1T3</b>	CO1	H	H		M			
	CO2	H	H		M	M		
	CO3	H	H					
	CO4	H	H					
	CO5	H	M		M			

**UNIT I**

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

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

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

**UNIT II**

**Principles that Guide Practice: Core Principles:** Principles That Guide Process, Principles That Guide Practice, Principles That Guide Each Framework Activity: Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.

**Requirements Modeling: Scenarios, Information, and Analysis Classes:** Requirements Analysis: Overall Objectives and Philosophy, Analysis Rules of Thumb, Domain Analysis, Requirements Modeling Approaches, Scenario-Based Modeling: Creating a Preliminary Use Case, Refining a Preliminary Use Case, Writing a Formal Use Case, UML Models That Supplement the Use Case: Developing an Activity Diagram, Swimlane Diagrams.

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

### UNIT III

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

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

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

### UNIT IV

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

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

### UNIT V

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

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

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

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

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

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

**Course Outcomes:**

On successful completion of this course, the students:

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

**UNIT I**

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

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

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

**UNIT II**

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

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

**The Relational Algebra and Relational Calculus:** Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus.

**UNIT III**

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

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

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

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

#### UNIT IV

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

**Indexing Structures for Files:** Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B<sup>+</sup>-Trees.

#### UNIT V

**Introduction to Transaction Processing Concepts and Theory:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Transaction Support in SQL.

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

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

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

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



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

**Course Code: 20CS1T4**

**Title: DATABASE MANAGEMENT SYSTEMS**

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

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

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

**Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**(5×10 = 50 Marks)**

UNIT – I

2. A) What is DBMS? Explain advantage of DBMS.  
    (OR)
- B) Explain *Three Schema Architecture* of DBMS with neat diagram.

UNIT – II

3. A) What is Constraint? Explain various *Constraints* of the Relational Model.  
    (OR)
- B) Describe *SELECT & PROJECT* Operations of Relational Algebra.

UNIT – III

4. A) What is *Generalization*? Explain with example.  
    (OR)
- B) What is *BCNF*? Explain with example.

UNIT – IV

5. A) What is Hashing? Describe *Internal & External* Hashing Techniques.  
    (OR)
- B) What is B-Tree? Construct B-Tree for the values 10, 20, 30, 40, 50, 60, 70, 80, 90 of order 3.

UNIT – V

6. A) Explain *Concurrency Control Based on Timestamp Ordering*.  
    (OR)
- B) Explain *Distributed Database Concepts* in detail

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

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

**Course Outcomes:**

On successful completion of this course, the students:

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

**UNIT I**

**Fundamentals:** Strings, Alphabet, Language, Operations, Finite Automaton Model, Acceptance of Strings and Languages, FA, Transition Diagrams and Language Recognizers.

**Finite Automata:** Deterministic Finite Automaton, Non Deterministic Finite Automaton (Simple Problems), Differences between NFA and DFA, NFA with  $\epsilon$  Transitions- *Significance of NFA with Epsilon*, *Acceptance of Language*, Conversions and Equivalence- *Conversion from NFA with  $\epsilon$  to NFA without  $\epsilon$* , *NFA to DFA Conversion*, *NFA with  $\epsilon$  to DFA*, Minimization of FSM, Equivalence between two FSMs, Equivalence of Moore and Mealy Machines.

**UNIT II**

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

**UNIT III**

**Grammar Formalism:** Regular Grammars - *Right Linear and Left Linear Grammars*, Inter Conversion- *Conversion of a Regular Grammar for a given Finite Automata*, *Construct FA from Regular Grammar*, Context Free Grammar, Derivation Trees, Sentential Forms, Right most and Leftmost Derivation of Strings.

**Context Free Grammars:** Ambiguity in Context Free Grammars. Minimization of Context Free Grammars. Chomsky Normal Form, Greibach Normal Form, Pumping Lemma for Context Free Languages, Enumeration Properties of CFL (Proofs Not Required), Simple Problems.

## UNIT IV

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

## UNIT V

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

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

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

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

**P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**  
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**M.Sc., (Computer Science) Programme - I Semester**

**Course Code: 20CS1T5**

**Title: THEORY OF COMPUTATION**

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

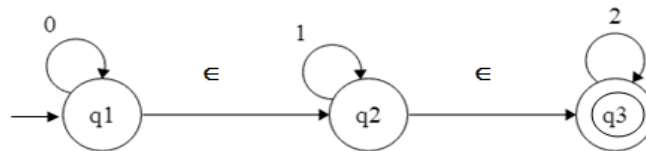
**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

- a) Define *Alphabet*.
- b) Find  $\epsilon$ -closure of all states for the given *Transition Diagram*.



- c) Define *Regular Expression* and *Regular Set* with example
- d) Write *Regular Expression* which denotes a language L over the set  $\Sigma = \{0\}$  having even length of string.
- e) Define *Parse Tree* with example.
- f) Show that the grammar is ambiguous  
 $S \rightarrow a \mid sA \mid \mid bSS \mid \mid SSb \mid \mid SbS \mid$
- g) Give the formal definition of *Push Down Automata*.
- h) Define *Deterministic PDA*.
- i) What are *Recursively Enumerable Languages*?
- j) Define *Turing Machine*.

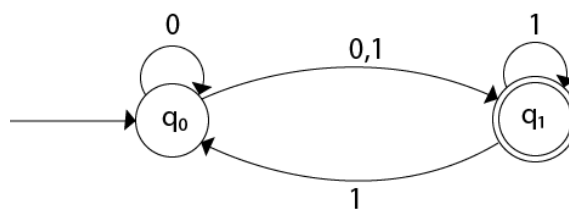
**Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**(5×10 = 50 Marks)**

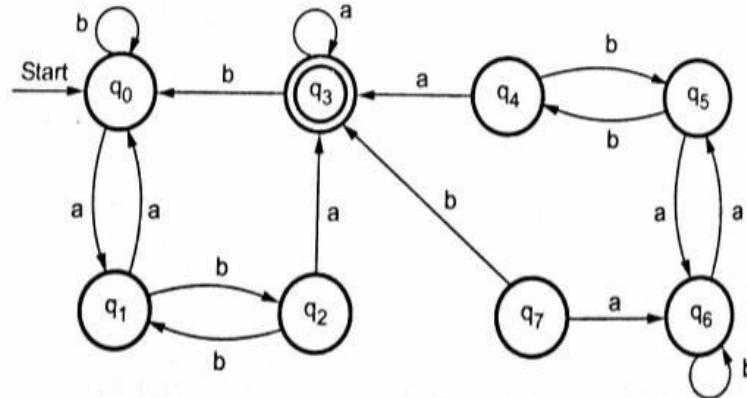
UNIT – I

- 1. A) Convert the given NFA to DFA.



(OR)

B) Construct the minimum DFA for the following *Transition Diagram*

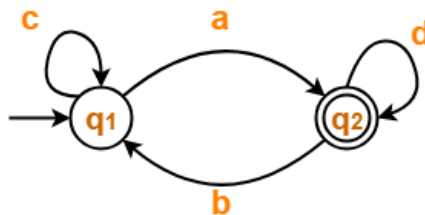


UNIT – II

2. A) Construct a finite automata for *Regular Expression*  $1+00+010^*$

(OR)

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



UNIT – III

3. A) Drive the string “aabbabba” for *Leftmost Derivation* and *Rightmost Derivation* using a CFG given by

- $S \rightarrow aB \mid bA$
- $A \rightarrow a \mid aS \mid bAA$
- $B \rightarrow b \mid bS \mid aBB$

(OR)

B) For the following grammar, construct CNF

- $S \rightarrow ABC \mid BbB$
- $A \rightarrow aA \mid BaC \mid aaa$
- $B \rightarrow bBb \mid a \mid D$
- $C \rightarrow CA \mid AC$
- $D \rightarrow \epsilon$

- i) Eliminate  $\epsilon$ -productions.
- ii) Eliminate any unit productions in the resulting grammar.
- iii) Eliminate any useless symbols in the resulting grammar.

UNIT – IV

4. A) Convert the following *Context Free Grammar* to *Push Down Automata*

$$S \rightarrow AA \mid a$$

$$A \rightarrow SA \mid b$$

(OR)

- B) The PDA is as given below

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

Where  $\delta$  is as given below

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

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

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

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

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

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

Construct the CFG equivalent to this PDA.

UNIT – V

5. A) Design a *Turing Machine* for the Language  $L = \{a^n b^n c^n \mid n \geq 1\}$

(OR)

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

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

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

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTER NETWORKS & OPERATING SYSTEMS LAB	20CS2L1	-	-	8	4	2020-21

**Course Outcomes:**

On successful completion of this course, the students:

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

**LAB LIST**  
**PART A**  
**Shell Scripting**

**Introduction to basic UNIX commands.**

1. Write a shell script to accept the name of the file from standard input and perform the following tests on whether the file exists, if exists test file permissions whether file is executable, readable, writable, both read & writable.
2. Write a script that will ask user, fullname (first, middle, last name) greet user by first name. Ask users DOB and calculate user's age.
3. Write a shell script which will display fibonacci series up to a given number of arguments.
4. Write a shell script to accept student number, name, marks in 5 subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat  
Rules: if avg  $\geq 90$  grade A+, 80-89 grade B+, 70-79 grade B, 69-69 grade C+, 51-50 grade C, 41-49 grade D else grade F
5. Write a shell script to accept empno, empname, and basic. Find DA, HRA, TA, PF using following rules. Display empno, empname, basic, DA, HRA, PF, TA, GROSS SAL and NETSAL. Also store details in a file called emp.dat. Rules: DA is 18% of basic if basic  $> 5000$  otherwise 550 DA is 35% of basic, PF is 12% of basic + DA, TA is 10% of basic.
6. Write a shell script to display reverse numbers from given arguments

**AWK scripting**

**7. Write awk script for the following**

- a. To print the numbers of even lines in a file.
- b. To print the numbers of Odd lines in a file.
- c. To delete empty lines in a file.
- d. To Display lines having more than 60 characters.
- e. To display the lines which match the multiple patterns.
- f. To display the lines which do not match the patterns.
- g. To display the lines or records 5-9 both inclusive.

**8. Write awk script for the following**

- a. To display the lines between two patterns (both inclusive).
- b. To display the specified line 5 or record in a file.
- c. List out the files which are created in March.
- d. Print the total size occupied by the files in your directory.

- e. Print the all lines by changing in to upper case.
  - f. Print line where fields have multiple field separators.
9. Write an awk program to display employee's pay bill (data file may be comma separated file containing (eno,name,basic) calculate DA,HRA,TA,PF(basic+da)

### **PART B**

#### **10. Scheduling algorithms (BTL3)**

- a) Write program to implement FCFS scheduling algorithm.
- b) Write program to implement Round Robin scheduling algorithm.
- c) Write program to implement SJF scheduling algorithm.

### **PART C**

- 11. a.Study different type of Guided media. Coaxial, UTP & OFC.  
b.Prepare straight and cross wire cable and test it.
- 12. Study network devices in detail (repeater, hub, switch, router, gateway).
- 13. Study of IP address (IPV4 - classification, Sub netting, super netting, IPV6).
- 14. Connect the computers in a local area Network.
- 15. Study basic network commands (ping, finger, ftp, traceroute, nslookup, pathping, telnet, arp).

### **PART D (Implementing Python /Java)**

- 16. Program to fetch the IP address of a system.
- 17. Program to obtain the information about the (a) Host (b) Port (c) protocol.
- 18. Write a program to accept the Website name and return its IP address.
- 19. Write a program to implement echoclient and echoserver.
- 20. Write a program to implement TCP client-server program.
- 21. Write a program to use Simple Mail Transfer Protocol.
- 22. Write a program to use the Domain Name System using UDP.
- 23. Implementation of sliding window protocol.
- 24. Find the subnet mask and Network address for the given IP address.

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

- 25. Configure a network using a server with five nodes using packet tracer.
- 26. Configure a network using a DHCP server with five nodes using packet tracer.
- 27. Configure a network using two DHCP servers with nodes using packet tracer.
- 28. Configure a network using three DHCP servers with nodes using packet tracer.
- 29. Configure a network with DHCP servers with wired and wireless nodes using cisco packet tracer.
- 30. Exhibit spanning tree algorithms





**Parvathaneni Brahmayya Siddhartha College of Arts & Science, Vijayawada – 520 010.**  
**(An Autonomous College in the jurisdiction of Krishna University)**  
**M.Sc., (Computer Science) Programme - I Semester**

COURSE	COURSE CODE	L	T	P	C	Year
DATA STRUCTURES LAB	CS1L1	-	-	6	3	2020-21

**Course Outcomes:**

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

1. Write well structured code for stack, queue and tree traversal operations.(CO1)
2. Analyze singly, doubly and circular linked lists.(CO2)
3. Implement binary tree, binary search tree, sparse matrix, DFS & BFS algorithms. (CO3)
4. Apply bubble, merge, quick and heap sorts. (CO4)
5. Implement linear and binary searches.(CO5)

**CYCLE 1**

1. Write a Java Program to create a class called Stack and implement Stack Operations. (BTL6)
2. Write a Java Program to create a class called Queue and implement Stack Operations. (BTL6)
3. Write a Java Program to convert the Infix to Postfix Expression. (BTL3)
4. Write a Java Program to evaluate Postfix Expression. (BTL4)

**CYCLE 2**

1. Write a Java Class to implement the operations of a Singly Linked List. (BTL3)
2. Write a Java Class to implement the operations of a Doubly Linked List. (BTL3)
3. Write a Java Class to implement the operations of a Circular Linked List. (BTL3)

**CYCLE 3**

1. Write a Java Program to implement operations on Binary Trees. (BTL3)
2. Write a Java Program to perform Binary Search Tree Traversal. (BTL3)
3. Write a Java Program to implement Sparse Matrix. (BTL3)
4. Write a Java Program to implement DFS Algorithm. (BTL3)
5. Write a Java Program to implement BFS Algorithm. (BTL3)

**CYCLE 4**

1. Write a Java Program to implement the following sorting techniques: (BTL3)  
a. Bubble Sort   b. Merge Sort.   c. Quick Sort.   d. Heap Sort.
2. Write a Java Program to implement the following search techniques: (BTL3)  
a. Linear Search                      b. Binary Search

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

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTER NETWORKS	20CS2T1	4	-	-	4	2020-21

**Course Outcomes:**

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

1. Understand functionality of *Layered Network Architecture*, Different types of *Transmission Media*. (CO1)
2. Understand various *Networks* and their functions. (CO2)
3. Understand the *IP Addresses* and various *Routing Algorithms* used in internetworking. (CO3)
4. Understand different *Transport Layer Protocols*. (CO4)
5. Understand the various *Application Layer Protocols* and *Security Issues* over internet. (CO5)

**UNIT I**

**Introduction:** Uses of Computer Networks: Business Application, Home Applications, Mobile Users, Social Issues, **Network Hardware:** Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks, **Network Software:** Protocol Hierarchies, Design Issues for the Layers, Connection Oriented and Connectionless Services, Service Primitives, The relationship of Services to Protocols, **Reference Models:** The OSI Reference Model, The TCP/IP Reference Model, A Comparison of OSI and TCP/IP Reference Model, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP reference model, **Example Networks:** The Internet, The Third Generation Mobile Phone Networks, Wireless LANs, RFID and Sensor Networks.

**Physical Layer: Guided Transmission Media:** Magnetic Media, Twisted Pair, Coaxial Cable, power lines, Fiber Optics

**UNIT II**

**Data Link Layer: Data Link Layer Design Issues:** Services Provided to the Network Layer, Framing, Error Control, Flow Control, **Error Correcting Codes, Error Detecting Codes, Elementary Data Link Protocols:** An Utopian Simplex Protocol, A Simplex Stop and Wait Protocol, A Simplex Protocol for a Noisy Channel, **Sliding Window Protocols:** A One Bit Sliding Window Protocol, A Protocol Using Go Back N, A Protocol using Selective Repeat

**The Medium Access Control Sub Layer: Ethernet:** Ethernet Cabling, Manchester Encoding, The Ethernet MAC sub layer Protocol, The Binary Exponential Backoff Algorithm, Ethernet Performance , Switched Ethernet , Fast Ethernet , Gigabit Ethernet, 10-bit Gigabit Ethernet , **Wireless Lans:** The 802.11 Protocol Stack, The 802.11 Physical Layer, The 802.11 MAC Sub Layer Protocol, The 802.11 Frame Structure, **Bluetooth:** Bluetooth Architecture, Bluetooth Applications, The Bluetooth Protocol Stack, The Bluetooth Radio Layer, The Bluetooth Link Layers, The Bluetooth Frame Structure, **Data Link Layer Switching:** Uses of Bridges, Learning Bridges ,Spanning Tree Bridges, Remote Bridges, Repeaters, Hubs, Bridges, Switches, Routers and Gateways, Virtual LANs.

### UNIT III

**The Network Layer: *Network Layer Design Issues:*** Store and Forward Packet Switching, Services provided to the Transport Layer, Implementation of Connectionless Services, Implementation of Connection Oriented Services, Comparison of Virtual Circuit and Datagram subnets. ***Routing Algorithms :*** The Optimality Principle, Shortest Path Routing, Flooding , Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing. ***Internet Working:*** How Networks Differ, How Networks can be connected, Concatenated Virtual Circuits, Connectionless Internetworking, Tunneling, Internetwork Routing, Packet Fragmentation, ***The Network Layer in the Internet:*** The IP Version 4 Protocol, IP address, Internet Control Protocols, OSPF, The Internet Gateway Routing Protocol, BGP, The Exterior Gateway Routing Protocol.

### UNIT IV

**The Transport Layer: *The Transport Service:*** Services provided to the Upper Layers, Transport Services Primitives, Berkeley Sockets. ***Elements of Transport Protocols:*** Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing. ***The Internet Transport Protocols:*** Introduction to UDP: Remote Procedure Call, The Real Time Transport Protocol. **The Internet Transport Protocols:** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Sliding Window, TCP Congestion Control, TCP Timer Management, Future of TCP.

### UNIT V

**The Application Layer: *DNS:*** The Domain Name System: The DNS Name Space, Resource Records, Name Servers. ***Electronic Mail:*** Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery. ***The World Wide Web:*** Architecture Overview, Static Web Pages, Dynamic Web Pages and Web Applications. **HTTP-**The Hyper Text Transfer Protocol. ***Streaming Audio and Video:*** Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, Real Time Conferencing. ***Network Security:*** Introduction to Cryptography, Public Key Algorithms-RSA.

Prescribed Text Book			
S.No.	Author	Title	Publisher
1	Andrew S. Tanenbaum	Computer Networks	Fifth Edition, Pearson <b>Chapters:</b> 1.1 to 1.5, 2.2, 3.1 to 3.4, 4.3, 4.4, 4.6, 4.8 5.1, 5.2.1 to 5.2.8, 5.5, 5.6.1 to 5.6.4,5.6.6,5.6.7, 6.1.1 to 6.1.3, 6.2.1 to 6.2.5, 6.4, 6.5, 7.1 ,7.2, 7.3.1 to 7.3.4, 7.4.1 to 7.4.5 ,8.1.1,8.3.1

Reference books			
S.No.	Author	Title	Publisher
1	Behrouz A Forouzan, Firouz Mosharaff	Computer Networks A Top Down Approach	McGrawhill Education(India) Special Indian Edition
2	James F.Kurose, Keith W. Ross	Computer Networking - A Top-Down Approach	6e, Pearson
3	Larry Peterson and Bruce Davie	Computer Networks - A System Approach	5e, Elsevier India

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**(An Autonomous College in the jurisdiction of Krishna University)**  
**M.Sc.(Computer Science) Programme - II Semester**  
**Course Code: 20CS2T1 Title: COMPUTER NETWORKS**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

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

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

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

UNIT – I

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

UNIT – II

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

UNIT – III

4. a) Explain any two *Dynamic Routing Algorithms*. (BTL2)
- (OR)
- b) Explain *IPV4 Packet Format* with neat diagram. (BTL2)

UNIT – IV

5. a) Explain *Real Time Protocol*. (BTL2)
- (OR)
- b) Explain *Connection Establishment* and *Termination* with neat diagram.(BTL2)

UNIT – V

6. a) Explain *Session Initiation Protocol*. (BTL2)
- (OR)

b) Explain *HTTP Request* and *HTTP Response* Messages.(BTL2)

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COURSE	COURSE CODE	L	T	P	C	Year
DATA STRUCTURES	20CS2T2	4	-	-	4	2020-21

**Course Outcomes:**

On successful completion of this course, the students:

1. To define data structures, operation of data structure, time and space complexities. (CO1)
2. To understand concepts of string processing, arrays, records and pointers, linked lists, stacks, queues, recursion, trees, graphs & searching techniques. about searching and sorting techniques. (CO2)
3. To implement applications of linked lists, stacks, queues, trees, graphs, sorting & searching techniques. (CO3)
4. To analyze applications of linked lists, stacks, queues, trees, graphs, sorting & searching techniques. (CO4)
5. To evaluate applications of linked lists, stacks, queues, trees, graphs, sorting & searching techniques in terms of time & space complexity. (CO5)

**UNIT 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

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**M.Sc., (Computer Science) Programme – II Semester**  
**Course Code: 20CS2T2 Title: DATA STRUCTURES**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

1. a) Define *Data Structures*.(BTL1)
- b) What is *Space Complexity*? (BTL1)
- c) What is *Linear Array*? (BTL1)
- d) What is *Sparse Matrix*? (BTL1)
- e) Define a *Priority Queue*. (BTL1)
- f) What is *Garbage Collection*? (BTL1)
- g) Define a *Binary Tree*. (BTL1)
- h) Define *AVL Tree*. (BTL1)
- i) Define *Graph*. (BTL1)
- j) What is *Sorting*? (BTL1)

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

**UNIT – I**

2. a) Discuss *Elementary Data Organization and Data Structure Operations*. (BTL6)  
(OR)

b) Explain various *Control Structures*. (BTL2)

**UNIT – II**

3. a) Explain Binary Search Algorithm and *Linear Search Algorithm* with an example. (BTL2)  
(OR)

b) Discuss *The Second Pattern Matching Algorithm* with example. (BTL6)

**UNIT – III**

4. a). Explain *Quick Sort Algorithm* with example. (BTL2)  
(OR)

b) Explain *Operations of Stack* and its representation using *Linked List* and *Array* with example. (BTL2)

**UNIT – IV**

5. a) Discuss *Binary Tree Traversal Techniques* using *Stack* in detail. (BTL6)  
(OR)

b) Briefly discuss about the insertion and deletion operations of *Binary Search Trees* with example. (BTL6)

**UNIT – V**

6. a) Explain the process of *Topological Sorting*. (BTL2)  
(OR)

b) Discuss about *Merge Sort* with an example. (BTL6)



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**M.Sc., (Computer Science) Programme - II Semester**

COURSE	COURSE CODE	L	T	P	C	Year
WEB TECHNOLOGIES	20CS2T3	4	-	-	4	2020-21

**Course Outcomes:**

On successful completion of this course, the students:

1. Students are able to describe the concepts of WWW including browser and HTTP protocol and various HTML tags and use them to develop the user friendly web pages. (CO1)
2. Students will be able to use the JavaScript and VBScript to develop the dynamic web pages. (CO2)
3. Students will be able to define the CSS with its types and develop the modern web pages using the HTML and XML elements with different layouts as per need of applications. (CO3)
4. Students use server side scripting with PHP to generate the web pages dynamically using the database connectivity. (CO4)
5. Develop the modern Web applications using the client and server side technologies and the web design fundamentals. (CO5)

**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.

**VB Script:** Introduction, Embedded VBScript code in an HTML Document, Comments, Variables, Array Variables, Operator, Assignment Operators, Numerical Operators, String Concatenation, Procedures, Sub Procedure, Function Procedure, Conditional Statements, Looping Statements, Object and VB script, Cookies, Cookie Variables, Creating a Cookie, A Cookie with Multiple Values, Reading Cookie Value.

**UNIT III**

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

**XML:** Introduction, HTML vs. XML, Syntax of XML Document, XML Attributes, Use of elements vs. Use of Attributes, XML Validation, Well Formed XML Documents, Valid XML Documents, XML DTD: internal DTD, external DTD, the 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.

#### UNIT IV

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

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

#### UNIT V

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

**Active Server Pages (ASP):** Introduction, Advantages of ASP, First ASP Script, Processing ASP Scripts with Forms, Variables and Constructs, Subroutines, Include/Virtual, ASP Cookies, ASP Objects, Connecting to Data with ASP.

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 I. Deitel	Internet and World Wide Web How To Program, 5e	Prentice Hall; 4th edition

Reference Text Books			
S.No.	Author	Title	Publisher
1	Robert W. Sebesta	Programming the world wide web.	Third Edition, Pearson Education (2007)
2	Anders Moller and Michaelschwarzbach	An Introduction to XML and web technologies.	Addison Wesley (2006)
3	Chris Battes	Web programming-Building Internet Application.	Second Edition, Wiley (2007).
4	Jeffrey C. fackson	Web Technologies- Computer Science Perspective.	Pearson Education (2008).

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**M.Sc., (Computer Science) Programme - II Semester**  
**Course Code: 20CS2T3 Title: WEB TECHNOLOGIES**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

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

1. a) Write about *HTTP*. (BTL1)
- b) Explain *TABLE* tag. (BTL2)
- c) What are *Identifiers* in JavaScript? (BTL1)
- d) Write the syntax of *VB Script*. (BTL1)
- e) What is a *Valid XML document*? (BTL1)
- f) Explain *Event Bubbling*. (BTL2)
- g) What is a *Servlet*? (BTL1)
- h) What are *Regular Expressions* in PHP? (BTL1)
- i) What are *Scriptlets*? (BTL1)
- j) Write about *Subroutines*. (BTL1)

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

**UNIT-I**

2. a) What is *Internet*? Explain *Services of Internet*. (BTL1)
- b) What is *Web Browser*? Explain it in detail. (BTL1)
- Or
- c) Illustrate *Frame Set* and *Frame Attributes* by writing program. (BTL2)
- d) Explain *Client - Server Architecture* of World Wide Web. (BTL2)

**UNIT-II**

3. a) Explain the scope of *Java Script Variables* with example. (BTL2)
- b) Explain briefly the characteristic of *Array Objects*. (BTL2)
- Or
- c) Explain *Document Object Model* in Java Script briefly. (BTL2)

**UNIT-III**

4. a) Discuss building an *External Style Sheet*. Explain advantages and disadvantages of *External Style Sheets* with an example. (BTL6)
- Or
- b) Discuss *Tabular Data Control* with an example. (BTL6)
- c) What is DTD? Explain the building blocks of DTD. (BTL1)

**UNIT-IV**

5. a) Explain the *Life Cycle* of Servlets. Write the session tracker that tracks the number of access and last access of data of a particular web page. (BTL2)
- Or
- b) Explain *String Processing* and *Regular Expressions*. (BTL2)
- c) Demonstrate concept of *Cookies*. (BTL2)

**UNIT-V**

6. a) Explain *Components of JSP* and write a *JSP Program* to accept *username* and *password* from a

user and validate them. (BTL2)

Or

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

c) Discuss the *Connecting to Database* with ASP. (BTL2)

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**M.Sc., (Computer Science) Programme - II Semester**

COURSE	COURSE CODE	L	T	P	C	Year
OPERATING SYSTEMS	20CS2T4	4	-	-	4	2020-21

**Course Outcomes:**

On successful completion of this course, the students:

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

**UNIT I**

**Introduction:** What Operating Systems Do, Computer System Organization, Computer System Architecture, Operating System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Kernel Data Structures, Computing Environments, Open Source Operating Systems.

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

**Processes:** Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication, Communication in Client-Server Systems.

**UNIT II**

**Threads:** Overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

**Process Synchronization:** Background, The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

**CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple Processor Scheduling.

**UNIT III**

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Main Memory:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Intel 32 and 64-bit Architectures.

**Virtual Memory:** Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing.

**UNIT IV**

**Mass Storage Structure:** Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap Space Management, RAID Structure.



**File System Interface:** File Concept, Access Methods, Directory and Disk Structure, File System Mounting, Protection.

**File System Implementation:** File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

## UNIT V

**I/O Systems:** Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations, STREAMS, Performance.

**Protection:** Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of the Access Matrix.

**Security:** The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Firewalling to Protect Systems and Networks.

Prescribed Text Book			
S.No	Author	Title	Publisher
1	Abraham Silberschatz, Peter Baer Galvin, Greg	Operating System Concepts	Ninth Edition, Wiley, 9 <sup>th</sup> Edition, 2015

Reference Text Books			
S.No	Author	Title	Publisher
1	William Stallings	Operating Systems-Internals and Design Principles	Fifth Edition, Pearson Education (2007)
2	Achyut S Godbole	Operating Systems	Second Edition, TMH (2007).
3	Flynn/McHoes	Operating Systems	Cengage Learning (2008).
4	Deitel & Deitel	Operating Systems	Third Edition, Pearson Education (2008)

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**M.Sc., (Computer Science) Programme – II Semester**

**Course Code: 20CS2T4**

**Title: OPERATING SYSTEMS**

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

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

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

**Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**(5×10 = 50 Marks)**

**UNIT – I**

2. A) Explain *Operating System Services*.(BTL2)
- (OR)
- B) Explain various aspects of *Inter Process Communication*.(BTL2)

**UNIT – II**

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

B) Demonstrate (BTL2)

- (i) First-Come, First-Served Scheduling with the following data

Process	Burst Time
P1	24
P2	3
P3	3

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

Process	Burst Time
P1	6
P2	8
P3	7

P4	3
----	---

**UNIT – III**

4. A) What are the *Necessary and Conditions* for *Dead Lock Situation* and also statemethods for *Deadlock Prevention*. (BTL1)

(OR)

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

**UNIT – IV**

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

(OR)

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

**UNIT – V**

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

(OR)

B) What is Encryption? Describe *Symmetric Encryption & Asymmetric Encryption* inDetail. (BTL1)

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**M.Sc., (Computer Science) Programme - II Semester**

COURSE	COURSE CODE	L	T	P	C	Year
TECHNICAL REPORT WRITING	20CS2T5	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)

<b>CO-PO MATRIX</b>								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>20CS2T5</b>	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.

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

COURSE	COURSE CODE	L	T	P	C	Year
MOBILE APPLICATION DEVELOPMENT	210E02	4	-	-	4	2020-21

**Course Outcomes:**

After Completion of the course students will be able to

- CO1. Understand the basics of Mobile Applications.
- CO2. Demonstrate Mobile Android APPs.
- CO3. Understand the skills in augmenting different types of OS.
- CO4. Design Android APP.
- CO5. Develop J2me Code.

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>210E02</b>	CO1		L		M	H		
	CO2			M	M	H		
	CO3	M			M		L	L
	CO4	H		H		H	L	
	CO5	H		H		H		L

<b>Unit 1</b>	<p><b>Getting Started with Android Programming:</b> The Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, Android Studio, Android SDK, Creating Android Virtual Devices, The Android Developer Community, Launching your first Android Application.</p> <p><b>Using Android Studio for Android Development:</b> Exploring the IDE, using code completion, Debugging your Application, Publishing your application.</p>
<b>Unit 2</b>	<p><b>Understanding Activities:</b> Life cycle of an Activity, Applying Styles and Themes to activity, Hiding Activity Title, Displaying Dialog window, Progress Dialog.</p> <p><b>Link Activities using Intents:</b> Returning results from an Intent, Passing data using Intent object</p> <p><b>Fragments:</b> Adding Fragments Dynamically, Life cycle of fragments, Interactions between fragments, understanding the Intent object, Intent filters.</p>

<b>Unit 3</b>	<p><b>Getting to know the Android User Interface:</b> Understanding components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the Action Bar, Creating the user interface programmatically, and Listening for UI notifications.</p> <p><b>Designing User Interface with Views :</b> Using Basic Views, Picker Views, List Views, List Fragment, Dialog Fragment, Preference Fragment , using Image Views, using Menus, using web view</p>
<b>Unit 4</b>	<p><b>Data Persistence :</b> Saving and Loading user preferences, Persisting data to Files, Creating and Using Databases</p> <p><b>Content Providers :</b> Sharing Data In Android, Using Content Provider, Creating And Using Your Own Content Providers</p> <p><b>Multimedia :</b> Playing Audio and Video, Recording Audio, Recording Video</p>
<b>Unit 5</b>	<p><b>Telephony Exploring Telephony background and terms</b> — Accessing telephony information — Interacting with Phone - working with SMS Messaging</p> <p><b>Notifications and Alarms :</b> Introducing Toast, Placing your Toast message, Making a custom toast, Introducing Notifications, Making custom Notifications, Introducing Alarms — Creating a simple alarm example.</p> <p>Email and Location Based Services — Sending Email , Displaying Maps , Getting Location Data, Monitoring a Location</p>

**Text books:**

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

**Reference books:**

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







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NAAC recredited at 'A+' level

*Autonomous -ISO 9001 – 2015 Certified*

**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Web Technologies Lab**

**Semester: III**

Course Code	20CS3L1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam Marks	70
Total Number of Lecture	90	Total Marks	100
Year of Introduction :2006	Year of Offering:2021	Year of Revision: 2021-22	Percentage of Revision: 20%

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

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

**CO1:** Build functional *Web Applications HTML*.

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

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

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

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

## Syllabus

### Course Details

#### HTML:

1. Develop HTML code to provide intra document linking. (CO1,L6)
2. Develop HTML code to provide inter document linking. (CO1,L6)
3. Develop a program to implement the three types of lists. (CO1,L6)
4. Create a HTML page using frames. (CO1,L6)
5. Develop a program to embed college picture into your web page and develop a short note on your college using paragraph tag. (CO1,L6)
6. Illustrate a suitable example; depict how we can align text using a table tag as follows. (CO1,L2)

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

7. Develop a program to create the time table as follows: (CO1,L6)

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

8. Create a Registration form that interacts with the user. Collect login name, password, date of birth,sex, address, qualification and display a "Thank you for registering" message when the user submits the form. (CO1,L6)

Login name:    
 Enter Password:    
 Reenter Password:    
 Birthdate:    
 Sex:  Male  Female  
 Enter Address   
 Enter qualification

**Java Script:**

9. Develop a script to compare two strings using String object. (CO1,L6)
10. Develop a script to generate random numbers within 1 to 10 and display the numbers in a table. (CO1,L6)
11. Develop a Java Script to update the information into the array, in the “onClick” event of the button “Update”. (CO1,L6)
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. (CO1,L6)

Item details	Price of item	Click here to select
	8399	<input type="checkbox"/>
	5000	<input checked="" type="checkbox"/>
	450	<input checked="" type="checkbox"/>
	399	<input type="checkbox"/>
YOUR TOTAL BILL IS 5450		

13. Develop a script to find the duplicate elements of an array. (CO1,L6)
14. Develop a script which generates a different greeting each time the script is executed. (CO1,L6)
15. Develop a JavaScript to check the number is Armstrong number or not by getting the number from textbox and the result is displayed in a alert dialog box. (CO1,L6)
16. Develop a java script code that accepts user name and password from user, Check their correctness and display appropriate alert messages. (CO1,L6)

**DHTML:**

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

**XML:**

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

**PHP:**

26. Illustrate PHP declarations and expressions to find factorial of a given number using. (CO5,L2)
27. Develop a PHP program that interacts with the user .Collect first name last name and date of birth and displays that information back to the user. (CO5,L6)
28. Develop a PHP program to connect MySQL Database. (CO5,L6)

**JSP:**

29. Develop a program to implement JSP directives. (CO4,L6)
30. Develop a JSP program for session tracking. (CO4,L6)

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

**Course Focus:** Employability

**Websites of Interest:**

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



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**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Data Mining Lab**

**Semester: III**

Course Code	20CS3L2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam Marks	70
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2018	Year of Offering : 2021	Year of Revision : 2021-22	Percentage of Revision: 20%

## **Course Objective:**

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

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

**CO1:** Understand the *Various Kinds of Tools*.

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

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

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

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

## **Using Weka Tool:**

1. How to create and load *Data Set* in *Weka*. (CO4,L1)
2. Interpret all the *Categorical (or Nominal) Attributes* and the *Real-Valued Attributes* separately. (CO2,L2)
3. Construct *Association Rules* using *Weka*.(CO2,L6)
4. Construct *Multilayer Perceptron* or *Neural Network*. (CO5,L6)
5. Construct *Time Series Forecasting* using *Weka*. (CO5,L6)
6. Demonstration of preprocessing to remove *Attributes, Instances* and *Perform Discretization* using dataset *weather.arff*. (CO2,L2)
7. Create *K-Mean Clustering* using *Weka*. (CO3,L6)
8. Develop *Decision Tree* by training data set using *Weka*. (CO3,L6)
9. Create *Hierarchical Clustering* using *Weka*. (CO3,L6)

10. Identifying and removing *Outliers* using Weka. (CO3,L1)

**Using R Programming:**

11. How to import data into R from text and excel files using *read.table()* and *read.csv* functions. (CO1,L1).
12. Create *Association Rules* using *Aprior Algorithm* in R. (CO5,L6)
13. Construct *Multilayer Perceptron* or *Neural Network* using R. (CO5,L6)
14. Apply *Time Series Analysis* using R. (CO5,L3)
15. Apply *Time Series Forecasting* using R. (CO5,L3)
16. Apply *Time Series Decomposition* using R. (CO5,L3)
17. Create *K-Means Clustering Algorithm* using R. (CO5,L6)
18. Construct *Decision Tree* in R using package *party*. (CO5,L6)
19. Create *Hierarchical Clustering* using R. (CO5,L6)
20. Create Hierarchical Clustering with Euclidean Distance using R. (CO5,L6)
21. Examine *K-Medoids* clustering using R. (CO5,L4)
22. *Detecting and Removing* outliers using R. (CO5,L1)
23. Construct *Density Based Clustering* using R. (CO5,L6)
24. Illustrate *Linear Regression* using R. (CO5,L2)
25. Illustrate *Multiple Regression* using R. (CO5,L2)
26. Illustrate *Logistic Regression* using R. (CO5,L2)
27. Construct *Outlier Detection by Clustering* using R. (CO5,L6)
28. *Detecting and Removing* Missing values in R. (CO3,L1)
29. Create different kinds of *Charts* using *Sample Data Sets* in R. (CO3,L6)
30. Create *Word Cloud* using R. (CO3,L6)

**Websites of Interest :**

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

**Course Focus:** Foundation / Employability / Skill Development.



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**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Internet of Things**

**Semester: III**

Course Code	20CS3T1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2018	Year of Offering:2021	Year of Revision:2021-22	Percentage of Revision: 60%

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

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

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

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

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

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

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

## Syllabus

### Course Details

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

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

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

**Course Focus:** Employability

#### Websites of Interest:

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



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**M.Sc., (Computer Science) Programme - III Semester**

**Course Code: 20CS3T1**

**Title: Internet of Things (IoT)**

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

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

1. a) What is *M2M Communication*. (CO1,L1)
- b) What are *Connected Devices*? (CO1,L1)
- c) Write about *Modified ISO*. (CO2,L1)
- d) What is a *Gateway*? (CO2,L1)
- e) What is *Communication Protocol*? (CO3,L1)
- f) What is *Resource and Resource Repository*? (CO3,L1)
- g) What is *Header*? Explain *TCP Header*. (CO4,L1)
- h) What is *Protocol Data Unit and Maximum Transferable Unit*. (CO4,L1)
- i) Write about *Event Data*. (CO5,L1)
- j) What are *Active and Passive Devices*? (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 an overview of IOT. (CO1,L2)

(or)

- b) Explain M2M Communication. (CO1,L2)

**UNIT II**

3. a) Explain various *Layers & Design Standardization Principles* of IOT. (CO2,L2)

(or)

- b) Explain different *communication technologies* used in IOT. (CO2,L2)

**UNIT III**

4. a) What are *Web Communication Protocols* for Connected Devices? (CO3,L1)

(or)

- b) What are various *Design Principles* for the Web Connectivity? (CO3,L1)

**UNIT IV**

5. a) Explain in detail *Internet Connectivity Principles*. (CO4,L5)

(or)

- b) Explain any two *Application Layer Protocols*. (CO4,L5)

**UNIT V**

6. a) Illustrate *Business Models* for *Business Processes* in the Internet of Things. (CO5,L2)

(or)

- b) Explain *Integration and Enterprise Systems*. (CO5,L2)



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**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Cryptography & Network Security**

**Semester: III**

Course Code	20CS3T2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2005	Year of Offering: 2021	Year of Revision: 2021-22	Percentage of Revision: 30%

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

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

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

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

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

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

**CO5:** Gain knowledge about *Intruders and Firewalls.*

## Syllabus

### Course Details

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

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

Reference Text Book			
	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Sixth Edition, 2014
2	William Stallings	Network Security Essentials- Applications and	Pearson Education (2007), Third Edition.

		Standards	
3	Chris McNab	Network Security Assessment	OReilly (2007), 2 <sup>nd</sup> Edition
4	Jon Erickson	Hacking-The Art of Exploitation	Press (2006),SPD
5	Neal Krawety	Introduction to Network Security	Thomson (2007).
6	Ankit Fadia	Network Security-AHackers Perspective	Macmillan (2008)
7	Behrouz A Forouzan, Debdeep Mukhopadhyay	Cryptography and Network Security	MCGraw-Hill, Indian Special Edition, Third Edition, 2015

**Course has focus on :** Employability

**Websites of Interest :**

1. [https://www.pearsonhighered.com/assets/hip/us/hip\\_us\\_pearsonhighered/preface/0132775069.pdf](https://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighered/preface/0132775069.pdf)
2. <http://faculty.mu.edu.sa/public/uploads/1360993259.0858Cryptography%20and%20Network%20Security%20Principles%20and%20Practice,%205th%20Edition.pdf>

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

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**M.Sc., (Computer Science) Programme - III Semester**  
**Course Code: 20CS3T2      Title: CRYPTOGRAPHY & NETWORK SECURITY**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

- 1) a) What is *Caesar Cipher*? (CO1,L1)
- b) Write any two characteristics of Randomness. (CO1,L1)
- c) What is the Purpose of the *Euclidean Algorithm*? (CO2,L1)
- d) What is Message Encryption? (CO2,L1)
- e) What is the difference between *Symmetric Key Distribution & Asymmetric Key Distribution*? (CO3,L1)
- f) What is *Mutual Authentication*? (CO3,L1)
- g) State any two Protocols of *Transport Layer Security*. (CO4,L1)
- h) What is *Pretty Good Privacy*? (CO4,L1)
- i) What is *Firewall*? (CO5,L1)
- j) State any two *Intrusion Detection Techniques*. (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 various *Security Attacks* and *Security Services*. (CO1,L2) 10 Marks  
    (or)
- b) Explain *AES Encryption* and *Decryption* Process. (CO1,L2) 10 Marks

UNIT II

- 3) a) Illustrate *Diffie-Hellman Key Exchange*. (CO2,L2) 10 Marks  
    (or)
- b) Explain *Internal and External Error Control* in Message Authentication Functions. (CO2,L2)  
    10

Marks

UNIT III

- 4) a) Explain *NIST Digital Signature Algorithm* with diagram. (CO3,L5) 10 Marks  
    (or)
- b) Explain *Kerberos* in detail. (CO3,L5) 10 Marks

UNIT IV

- 5) a) Explain *Confidentiality* and *Authentication* in S/MIME (CO5,L5) 10 Marks  
    (or)
- b) Illustrate *Overview of IP Security*. (CO4,L5) 10 Marks

UNIT V

- 6) a) Discuss what are the problems that may intruder create and explain how to overcome those problem? (CO5,L6) 10 Marks  
    (or)
- b) Discuss *Various Types of Firewalls*. (CO5,L6) 10 Marks



# P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010.

NAAC recredited at 'A+' level

*Autonomous -ISO 9001 – 2015 Certified*

**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Design & Analysis of Algorithms**

**Semester: III**

Course Code	20CS3T3	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2005	Year of Offering:2021	Year of Revision: No	Percentage of Revision:0%

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

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

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

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

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

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

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

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<b>Introduction:</b> What is Algorithm, Algorithm Specification Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity Time Complexity, Asymptotic Notation, Performance Measurement, Randomized Algorithms: Basics of Probability Theory, Randomized Algorithms Identifying the Repeated Element, Primality Testing: Advantages and Disadvantages. <b>Elementary Data Structures:</b> Stacks and Queues, Trees: Terminology, Binary Trees, Dictionaries: Binary Search Trees, Priority Queues, Heaps , Heapsort , Sets	10

	and Disjoint Set Union: Introduction-Union and Find Operations, Graphs: Introduction, Definitions, Graph Representations.	
II	<b>Divide-and-Conquer:</b> 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 $O(n \log n)$ Divide and Conquer Algorithm. <b>The Greedy Method:</b> The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.	14
III	<b>Dynamic Programming:</b> 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. <b>Basic Traversal and Search Techniques:</b> Techniques for Binary Trees, Techniques for Graphs: Breadth First Search and Traversal-Depth First Search, Connected Components and Spanning Trees, Bi-Connected Components and DFS.	17
IV	<b>Backtracking:</b> The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem. <b>Branch and Bound :</b> The Method: Least Cost Search, The 15 Puzzle Control Abstractions for LC Search, Bounding, FIFO Branch and Bound , LC Branch and Bound, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution, Traveling Sales person.	11
V	<b>NP-Hard and NP-Complete Problems:</b> Basic Concepts: Non Deterministic Algorithms, The Classes NP Hard and NP Complex, Cook's Theorem, NP Hard Graph Problems, Clique Decision Problem, Node Cover Decision Problem Chromatic Number Decision Problem, Directed Hamiltonian Cycle, Traveling Sales Person Decision Problem, AND/OR Graph Decision Problem, NP-Hard Scheduling Problems, Scheduling Identical Processors, Flow Shop Scheduling, Job Scheduling, NP-Hard Code Generation Problems, Code Generation With Common Sub Expressions, Implementing Parallel Assignment Instructions, Some Simplified NP-Hard Problems.	8

Prescribed Text Book

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

Reference Text Books

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

**Course Focus:** Foundation / Skill Development.

**Reference Websites :**

1. <https://epgp.inflibnet.ac.in/Home>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/lecture-notes/>
3. [https://www.cukashmir.ac.in/cukashmir/User\\_Files/imagefile/DIT/StudyMaterial/DAA/DAA\\_U NIT I\\_6th-Sem\\_StudyMaterial.pdf](https://www.cukashmir.ac.in/cukashmir/User_Files/imagefile/DIT/StudyMaterial/DAA/DAA_U NIT I_6th-Sem_StudyMaterial.pdf)



**P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**  
**(An Autonomous College in the jurisdiction of Krishna University)**  
**M.Sc.(Computer Science) Programme - III Semester**  
**Course Code: 20CS3T3 Title: DESIGN AND ANALYSIS OF ALGORITHMS**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

1.
  - a) Define *Algorithm*. (CO1,L1)
  - b) What is a *Priority Queue*? (CO1,L1)
  - c) Define *Convex Hull*. (CO2,L1)
  - d) What is *Tree Vertex Splitting*? (CO2,L1)
  - e) What is *String Editing*? (CO3,L1)
  - f) Differentiate *DFS and BFS*. (CO3,L1)
  - g) What is *Graph Colouring*? (CO4,L1)
  - h) What is *LC and FIFO Branch and Bound*? (CO4,L1)
  - i) Compare *NP Hard and NP Complete Classes*. (CO5,L1)
  - j) What is *flow shop scheduling in NP Hard Scheduling problems*? (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 *Asymptotic Notations* regarding time and space complexities of an algorithm. (CO1,L2)  
(or)  
b) Explain in detail about *Heap Sort Technique* with an example. (CO1,L2)

UNIT – II

3. a) What is *Divide and Conquer approach*? Apply it on *Quick Sort* with an example. (CO2,L2)  
(or)  
b) What is *Greedy method*? Explain *Kruskal's Algorithm* to find *minimum cost spanning tree* with an example. (CO2,L2)

UNIT – III

4. a) Explain the application of *Dynamic Programming* on *Travelling Salesman Problem*. (CO3,L2)  
(or)  
b) Explain the procedure to obtain *Optimal Binary Search Tree* by applying *Dynamic Programming* approach. (CO3,L2)

UNIT – IV

5. a) What is *0/1-Knapsack Problem*? Solve it using *Branch and Bound Technique*. (CO4,L2)  
(or)  
b) Explain the *Sum of Subsets Problem*. How can it be solved using *Back Tracking Technique*? (CO4,L2)

UNIT – V

6. a) Write *Cook's theorem*. Briefly explain *Cook's theorem*. (CO5,L2)

(or)

b) Discuss various *NP Hard Graph Problems*. (CO5,L2)



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Siddhartha Nagar, Vijayawada – 520 010.

NAAC recredited at 'A+' level

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**Programme: M.Sc. (Computer Science)**

**Title of the Paper: Data Mining Techniques**

**Semester: III**

Course Code	20CS3T4	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2005	Year of Offering:2021	Year of Revision: 2018-19	Percentage of Revision:20%

## **Course Objective:**

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

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

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

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

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

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

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

## Syllabus

### Course Details

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

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

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

**Websites of Interest:**

1. [www- db.stanford.edu /ullman/mining/mining.html](http://www-db.stanford.edu/~ullman/mining/mining.html) : Data mining lecture notes.
2. [ocw.mit.edu/ocwweb/slon-School-of-management/15-062Data-Mining Spring2003/course](http://ocw.mit.edu/ocwweb/slon-School-of-management/15-062Data-Mining Spring2003/course)

**Course Focus:** Foundation / Employability / Skill Development.

**P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**  
**(An Autonomous College in the jurisdiction of Krishna University)**  
**M.Sc., (Computer Science) Programme - III Semester**  
**Course Code: 20CS3T4 Title: DATA MINING TECHNIQUES**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

1. a) Difference between *Data Mining* and *KDD* (CO1,L4)  
b) What is meant by *Data Preprocessing*? (CO1,L1)  
c) Define *Multidimensional Data model*. (CO2,L1)  
d) OLAP versus OLTP (CO2,L4)  
e) Give one example for *Closed Itemset* and *Maximal Frequent Itemset* (CO3,L1)  
f) What is meant by *Association Rule*? (CO3,L1)  
g) Explain *Bayes Theorem*. (CO4,L2)  
h) Define *Classification* with Example. (CO4,L1)  
i) What are the requirements of *Cluster Analysis*? (CO5,L1)  
j) What is meant by *Outliers*? (CO5,L1)

**Answer Five Questions Choosing One Question from Each Unit.**

**All Questions Carry Equal Marks.**

**(5×10 = 50 Marks)**

UNIT – I

2. a) Define Data Mining. What kinds of Patterns can be mined in *Data Mining*. 10M (CO1,L1)  
(or)  
b) Define *Data Integration*. What are the *Different Techniques used in Data Integration*. 10M (CO1,L1)

UNIT – II

3. a) Define *Data Warehouse*. Explain *Data Warehouse Architecture* with neat Diagram. 10M (CO2,L1)  
(or)  
b) What are the different types of *Schemas* used in *Multi Dimensional Data Model*? 10M (CO2,L1)

UNIT – III

4. a) Explain *Aprior Algorithm* with Example. 10M (CO3,L2)  
(or)  
b) Explain *Multi Level and Multi Dimensional Association Rules* with Examples. 10M (CO3,L2)

UNIT – IV

5. a) Explain *Decision Tree Induction Algorithm* with Example. 10M (CO4,L5)  
(or)  
b) Explain *Naïve Bayes Classification* with Example. 10M (CO4,L5)

UNIT – V

6. a) Explain *Different Partitioning Methods* used in *Cluster Analysis*. 10M (CO5,L2)  
(or)  
b) Explain in detail about *Hierarchical Clustering*. 10M (CO5,L2)



**P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE**

Siddhartha Nagar, Vijayawada – 520 010

NAAC reaccredited at 'A+' level

*Autonomous -ISO 9001 – 2015 Certified*

**Name of the Program: OPEN ELECTIVE**

**Title of the Course: PERSONAL FINANCE**

**Semester: IV**

Course Code	<b>21OE07</b>	Course Delivery Method	Class Room / Blended
Credits	<b>4</b>	CIA Marks	<b>30</b>
No. of Lecture Hours / Week	<b>05</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>75</b>	Total Marks	<b>100</b>
Year of Introduction: <b>2022</b>	Year of Offering : <b>2022</b>	Year of Revision : <b>NA</b>	Percentage of Revision : <b>NA</b>

**Course Objective:** This course aims to improve students understanding of human behavior in organization and the ability to lead people to achieve more effectively toward increased organizational performance.

**Course Outcomes:**

- CO-1** To identify the benefits of using personal finance planning techniques in managing personal finances of an individual.
- CO-2** To understand the various constituents of capital markets.
- CO-3** To analyse various Investment avenues as a part of investment management.
- CO-4** To understand Investment decision making process.
- CO-5** To understand the basic principles of income taxes and implement and effective tax planning strategy.

<b>CO-PO MATRIX</b>								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>21OE07</b>	CO1			M	M			L
	CO2		L	M	M	L		
	CO3			H	M			
	CO4			M			L	
	CO5	L			M	H		

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>I</b>	<b>Conceptual understanding of</b> : Income - Expenditure, Investment – Savings, Wealth – Interest – Risk uncertainty – Time value of money – Relationship between Inflation and Interest rates.	<b>12</b>
<b>II</b>	<b>Financial Markets:</b> Capital Market – Components of Capital Markets – Primary Market and Secondary Market – Equity and Debt Market; Money Market Instruments– Commodity Markets; Derivatives Markets; Foreign Exchange Market.	<b>20</b>
<b>III</b>	<b>Investment Management:</b> Meaning and importance –Various Asset classes: equity, debt, gold, real estate, mutual funds, and exchange traded funds- Investment Decision cycle	<b>10</b>
<b>IV</b>	<b>Investment Decisions:</b> Investment alternatives - Savings deposit, Fixed Deposit, Post office saving schemes, LIC, Corporate deposits, Credit corporate society schemes, Chit fund investment – Overview of Stock Exchange.	<b>13</b>
<b>V</b>	<b>Tax planning:</b> Basic terms of income tax, advance tax, tax deduction at source - deductions under section 80C, 80 CCC, 80 D and 80 G - Taxation of investment products - Retirement planning, Management of nomination, Gift deed, power of attorney and will – Estate planning.	<b>20</b>

### REFERENCES

1. Ahuja, GK& Gupta Ravi. Systematic Approach to Income Tax, Allahabad, Bharat Law House.
2. Shasi K Gupta Financial Management: 2013 8<sup>th</sup> Edition Kalyani Publishers
3. Personal Financial Literacy, Pearson Education, Inc./Prentice-Hall Publishing, 2010 ©. Jeff Madura, Mike Casey, Sherry J. Roberts, authors.

**Course Focus:** Foundation.



**MODEL QUESTION PAPER  
PG DEGREE EXAMINATION**

**PERSONAL FINANCE**

**Duration: 3 hours**

**Maximum Marks: 70**

**SECTION- A**

*Answer Any Five of the Following Questions*

**5×4=20 Marks**

**1. Write short notes on**

- |           |                                 |              |
|-----------|---------------------------------|--------------|
| <b>a.</b> | <b>Risk Vs uncertainty (Or)</b> | <b>L2 C1</b> |
|           | <b>Inflation.</b>               | <b>L2 C1</b> |
| <b>b.</b> | <b>Debt market (Or)</b>         | <b>L2 C2</b> |
|           | <b>Treasury bills</b>           | <b>L2 C2</b> |
| <b>c.</b> | <b>Equity (Or)</b>              | <b>L2 C3</b> |
|           | <b>ETFs</b>                     | <b>L2 C3</b> |
| <b>d.</b> | <b>Corporate deposit. (Or)</b>  | <b>L2 C4</b> |
|           | <b>Insurance</b>                | <b>L2 C4</b> |
| <b>e.</b> | <b>Gift deed. (Or)</b>          | <b>L2 C5</b> |
|           | <b>80C Deductions</b>           | <b>L2 C5</b> |

**SECTION – B**

*Answer All Questions*

**5×10=50Marks**

2.	a)	Define Time value of money. How it can be calculated?	L2 CO1
		OR	
	b)	Briefly discuss the relationship between Inflation and Interest rates.	L2 CO1
3.	a)	What is a Mutual Fund? Distinguish between open ended and close ended funds.	L2 CO2
		OR	
	b)	What is capital market? Briefly explain about the instruments of money market?	L2 CO2
4.	a)	What is Investment management? Explain the objectives and importance of investment management.	L3 CO3
		OR	
	b)	Briefly explain various steps involved in investment decision cycle.	L3 CO3
5.	a)	Discuss various investment alternatives available for investors.	L2 CO4
		OR	
	b)	What is Stock exchange? Explain the process of trading through stock exchanges.	L2 CO4
6.	a)	What are the basic concepts of tax planning? Explain.	L2 CO5
		OR	
	b)	Briefly explain the concept of Estate planning.	L2 CO5





# P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

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*Autonomous -ISO 9001 - 2015 Certified*

**Programme: M.Sc.(Computer Science)**

**Title of the Paper: Big Data and Analytics Lab**

**Semester: IV**

Course Code	20CS4L1	Course Delivery Method	Face-to-face/Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam	70
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2020	Year of Offering: 2021	Year of Revision: 2021-22	Percentage of Revision: 20%

**Course Objectives :** This Course focuses on implementation of *Hadoop Distributed File System*, Implementation of *Map Reduce Operations*, Implementation of *Nosql Database* (MongoDB), Implementation of *Hadoop Eco System Components* (Apache PIG), Implementation of *Basic Visualization and Analytics* using Tableau.

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

CO1 : To implement *Hadoop Distributed File System*.

CO2 : Evaluate *Map-reduce in Java / Python in HDFS*.

CO3 : Evaluate to implement *Processing Data with NoSQL* (MongoDB).

CO4 : Evaluate *Map Reduce in Java/Python, Apache Pig*.

CO5 : *Extracting Data, Data Blending, Moving from Test to Production Databases in Tableau, Connecting to various Data Sources, Creation of Charts, Data Blending and Trend Lines in Tableau for Data Visualization.*

1. Demonstration of Hadoop standalone installation in Linux. (CO1,L2)
2. Demonstration of Hadoop installation on Windows Environment - VM Virtual Box. (CO1,L2)
3. Illustration of Hadoop Distributed File System. (HDFS). (CO1,L2)

4. Apply Map Reduce Algorithm for Word Count. (Java/Python). (CO4,L3)
5. Experimenting *Map Reduce Program* that mines *Weather Data*. (Java / Python). (CO4,L3)
6. Demonstration *Apache Pig Installation*. (CO2,L2)
7. Apply Basic Operations on Apache Pig (*Load, Foreach..Generate, Group, Join, Dump / Store.*) (BTL3)
8. Apply Operations (Create, Alter, and Drop) on Hive *Databases, Tables, Views, Functions, and Indexes.*(BTL3)
9. Illustration of *MongoDb* installation. (CO3,L2)
10. Apply *MongoDB* Commands. (CO3,L3)
11. Apply *CRUD (Create Read Update and Delete)* operations in *MongoDB*. (CO3,L3)
12. Create a *Collection with Bulk Documents* in one level (CO3,L6)
13. Apply operation on arrays in *MongoDB*.(CO3,L3)
14. Apply *Aggregate* and *Map Reduce Function* in *MongoDB*.(CO3,L3)
15. Creating *New Workbooks, Opening Existing Workbooks* in Tableau.(CO5,L6)
16. Create *Bar Chart, Line / Area Chart, Pie Charts* in Tableau. (CO5,L6)
17. Create a *Cross-Tab* in Tableau. (CO5,L6)
18. Apply *Data Blending using different data sources* in Tableau. (CO5,L3)
19. Create *Dual Axis / Shared Axis* in Tableau.(CO5,L3)
20. Create *Scatter Plot, Bubble Chart Blending* in Tableau. (CO5,L6)
21. Build *Trend Lines* and *Analytic* in Tableau.(CO5,L6)

**Course has focus on :** Employability

**Websites of Interest :**

1. Big Data Computing (noc19-cs33 – NPTEL videos ) :Prof Rajiv Misra,Dept of CSE, IIT Patna
2. Tableau Training for Beginners | Edureka <https://www.youtube.com/watch?v=aHaOivR00So>
3. Tableau Training for Beginners | Simplilearn <https://www.youtube.com/watch?v=Wh4sCCZjOwo>

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



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NAAC reaccredited at 'A+' level

*Autonomous -ISO 9001 – 2015 Certified*

**Programme: M.Sc. (Computer Science)**

**Title of the Paper: Project work**

**Semester: IV**

Course Code	20CS4P1	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)

(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	PO1	PO2	PO3	PO4	PO5	PO6	PO7
20CS4P1	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 <b>Internal / External</b> 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.



# P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010.

NAAC reaccredited at 'A+' level

*Autonomous -ISO 9001 – 2015 Certified*

**Programme: M.Sc. (Computer Science)**

**Title of the Paper: Big Data and Analytics**

**Semester: IV**

Course Code	20CS4T1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2018	Year of Offering:2021	Year of Revision:2021-22	Percentage of Revision:10%

## Course Outcomes:

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

1. Big data and its role in daily life.
2. How data is stored and processed in Hadoop.
3. *Map Reduce & Modern Databases* used in *Big Data Analytics*.
4. Hadoop Eco System.
5. Visualization of data with Tableau.

## 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 of NoSQL, What we miss with NoSQL?, Use of NoSQL in Industry, SQL vsus NoSQL.

**MongoDB:** What is MongoDB?, Why MongoDB?, Using JavaScript, Script Object Notation, Generating Unique Key, Support for Dynamic Queries, Storing Binary Data, Replication, Sharding, Updating Information in Place, Terms used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language?

### 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

**Introduction to Tableau:** What is Tableau?, Opening Existing Workbooks, Creating New Workbooks, Tableau.

**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,(Top 10 Chart Types:** Bar Chart, Line/Area Chart, Pie Chart, Text Table/Crosstab, Scatter Plot, Bubble Chart, Bullet Graph, Box Plot, Tree Map, Word Cloud.



Prescribed Text Book			
	Author	Title	Publisher
1	Seema Acharya, Subhashini Chellappan	BigData and Analytics	Wiley Publications.(Unit I, II, III,IV)
2	George Peck	Tableau 9 - The official guide	Mcgraw hill - 2016

Reference Text Books			
	Author	Title	Publisher
1	Nathan, Marz James Warren	Big Data Principles and Best Practices of Scalable Real Time Data Systems	MANNING Publications 2015
2	Tom White		O'Reilly, Yahoo Press, 3e
3	Stirrup,Nandeshwar,Ohmann ,Floyd		Packt Publishing 2016

**P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**  
**(An Autonomous College in the jurisdiction of Krishna University)**  
**M.Sc.(Computer Science) Programme - IV Semester**  
**Course Code: 20CS4T1 Title: Big Data and Analytics**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Answer ALL questions**

**Max.Marks: 70**  
**(10×2 = 20 Marks)**

1. a. Tell whether *Big Data* is only used for *Big Organizations*. (CO1,L1)
- b. Summarize the Skills required for data scientist (CO1,L2)
- c. Outline the role of *Prescriptive Analytics*. (CO2,L2)
- d. How *Flume* and *Scoop* impacts *Hadoop Eco System*. (CO2,L1)
- e. What is the essentiality of *Secondary Name Node* in *Hadoop*. (CO3,L1)
- f. Why *YARN* a boon to Map Reduce Applications, justify? (CO3,L1)
- g. Relate the role of *Cursors* in *MongoDB*. (CO4,L1)
- h. List out the real life applications of *MongoDB*. (CO4,L1)
- i. Define *Dimension* and *Measure* in *Tableau* with examples. (CO5,L1)
- j. Compare TDS and TDE in *Tableau*. (CO5,L2)

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

2. a. Explain the *Digital data* with examples. (CO1,L2) 5Marks
- b. Summarize the challenges faced by *Bigdata*. (CO1,L2) 5 Marks  
(or)
- c. Explain *Brewers Theorem* with examples. (CO1,L2) 5 Marks
- d. 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, BTL5) 10 Marks

(or)

b. Explain *CRUD Operations* in *MongoDB* with examples. (CO4, L5) 5 Marks

c. Explain *MongoDB import* and *export* with examples. (CO4, L5) 5 Marks

### UNIT V

6. a. Explain *Data Blending* in tableau with examples. (CO5, L5) 10 Marks

(or)

b. Explain *Join Operations* with illustrations.(CO5, L5) 5 Marks

c. Explain Creation of *Crosstab*, *Word Cloud*, *Bullet Graph* and *Tree Map*. (CO5, L5) 5 Marks



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**Programme: M.Sc. (Computer Science)**

**Title of the Paper: Artificial Intelligence & Machine Learning**

**Semester: IV**

Course Code	20CS4T2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2018	Year of Offering:2021	Year of Revision:2021-22	Percentage of Revision:10%

**Course Objective:** This course focuses on *How to realize the Intelligent Human Behaviors on a Computer and introduces the Fundamental Methods at the core of modern Machine Learning*. It enables a computer to *Learn, Plan, and Solve* problems *Autonomously*. It covers *Theoretical Foundations* as well as *Essential Concepts* in *Supervised and Unsupervised Learning, ANN, Instance Based Learning*.

## **Course Outcomes:**

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

**CO1 :** Identify problems that are amenable to *AI Techniques* and analyse *Search Techniques* to solve those problems.

**CO2 :** Understand *Representation Languages* like *First Order Logic*.

**CO3 :** Formalize and implement different *AI Algorithms*, various *Knowledge Representations* and identify the importance of planning to solve *AI Problems*.

**CO4 :** Understand about basics of *Machine Learning* and *Conceptual Learning*.

**CO5 :** Acquire knowledge about *ANN* and *Instance Based Learning*.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p><b>Introduction:</b> What Is AI? The Foundations of Artificial Intelligence, The History of Artificial Intelligence.</p> <p><b>Solving Problems by Searching:</b> Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.</p>	10
II	<p><b>First-Order Logic:</b> Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.</p> <p><b>Inference in First-Order Logic:</b> Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.</p>	10
III	<p><b>Classical Planning:</b> Definition of Classical Planning ,Algorithms for Planning as State-Space Search, Planning Graphs, Other Classical Planning Approaches, Analysis of Planning Approaches.</p> <p><b>Knowledge Representation:</b> Ontological Engineering, Categories and Objects Events, Mental Events and Mental Objects.</p>	15
IV	<p><b>Learning from Examples:</b> Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models.</p> <p><b>Reinforcement Learning:</b> Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.</p>	15
V	<p><b>Artificial Neural Networks:</b> Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on the Backpropagation Algorithm, Recurrent Networks, Dynamically Modifying Network Structure.</p> <p><b>Instance-Based Learning:</b> Introduction, K-Nearest Neighbour Learning, Radial Basis Functions, Case-Based Reasoning.</p>	10

### Prescribed Text Book

Author	Title	Publisher
1 Stuart J. Russell and Peter Norvig	Artificial Intelligence A Modern Approach	Prentice Hall, Third edition,2010 1.1,1.2,1.3,3.1,3.2,3.3,3.4,3.5,3.6, 8.2,8.3,8.4,9.1,9.2,9.3,9.4,9.5, 10.1,10.2,10.3,10.4,10.5,12.1,12.2, 12.3,12.4,18.1,18.2,18.3,18.4,18.5, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6

2	Tom.M. Mitchell	Machine Learning	TMH (2013) 4.2,4.3,4.4,4.5,4.6,4.7, 4.8,8.1,8.2,8.4,8.5.
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Reference Text Book			
	<b>Author</b>	<b>Title</b>	<b>Publisher</b>
1	Winston. P.H	Artificial Intelligence	Addison Wesley (1993)
2	Peter Flach	Machine Learning The Art Cambridge and Science of Algorithms University that Make Sense of Data Press	PearsonEducation (2007), Third Edition.
3	Elaine Rich& Kevin Knight	Artificial Intelligence	TMH (1991)

**Course has focus on :** Foundation, Employability

**Websites of Interest :**

1. <https://www.cs.utexas.edu/~mooney/cs343/>
2. <https://www.cin.ufpe.br/~cavmj/Machine%20-%20Learning%20-%20Tom%20Mitchell.pdf>
3. [https://www.researchgate.net/publication/337704931\\_Concept\\_of\\_Artificial\\_Intelligence\\_its\\_Impact\\_and\\_Emerging\\_Trends](https://www.researchgate.net/publication/337704931_Concept_of_Artificial_Intelligence_its_Impact_and_Emerging_Trends)
4. <https://machinelearningmastery.com/basic-concepts-in-machine-learning/>

**P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.**  
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**M.Sc.(Computer Science) Programme- IV Semester**  
**Course Code: 20CS4T2 Title: ARTIFICIAL INTELLIGENCE & MACHINE**  
**LEARNING**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**  
**Answer ALL questions**

**Max. Marks: 70**  
**(10×2 = 20 Marks)**

- 1) a) What is *Artificial Intelligence*? (CO1,L1)
- b) What is *Heuristic*? (CO1,L1)
- c) What are *quantifiers*? (CO2,L1)
- d) Differentiate *Propositional* vs *First Order Logic*. (CO2,L1)
- e) What is *PDDL*? (CO3,L1)
- f) What are *Categories* and *Objects*? (CO3,L1)
- g) What is *Regression*? (CO4,L1)
- h) What is *Q Learning*? (CO4,L1)
- i) What is *Perceptron*? (CO5,L1)
- j) What is *Case Based Reasoning*? (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 *Gestation and Birth* of AI. (CO1,L2) 10 M  
(or)
- b) Explain *Informed Search Strategies* in brief. (CO1,L2) 10 M

UNIT- II

- 3) a) Discuss Syntax and Semantics of *First Order Logic*. (CO2,L2) 10 M  
(or)  
b) Explain *Forward chaining and Backward Chaining Algorithms* with an example. (CO2,L2) 10 M

UNIT-III

- 4) a) Explain Algorithms for *State space Search* briefly. (CO3,L2) 10 M  
(or)  
b) Explain *Mental Events and Mental Objects* in detail. (CO3,L2) 10 M

UNIT-IV

- 5) a) Explain *Decision Trees* concept with an example. (CO4,L5) 10 M  
(or)  
b) Compare *Passive Reinforcement Learning* and *Active Reinforcement Learning*. (CO4,L5) 10 M

UNIT-V

- 6) a) Discuss *MultiLayer Networks* and *Backpropagation Algorithm*. (CO5,L6) 10 M  
(or)  
b) Discuss the concepts in *K-Nearest Neighbour Learning*. (CO5,L6) 10 M





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**Programme: M.Sc. (Computer Science)**

**Title of the Paper: Cloud Computing**

**Semester: IV**

Course Code	20CS4T3	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2018	Year of Offering:2021	Year of Revision: No	Percentage of Revision: 0%

**Course Objective:** To understand benefits of *Cloud Computing* and *Virtualization, Services* and *Deployment Models of Cloud Computing*, To develop *Cloud Applications* using *Open Source Cloud Software, AAA Model*, Challenges and Benefits of *Mobile Cloud Computing*.

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

**CO1:** Articulate the *Main Concepts, Key Technologies, Strengths, and Limitations* of *Cloud Computing* and the core issues of *Virtualization*.

**CO2:** Understand the *Open Source Architectures* and *Services of Cloud Computing*.

**CO3:** Develop and deploy *Cloud Applications* using *Popular Cloud Platforms*.

**CO4:** Explore the *Risks, Consequences* and *Costs of Cloud Computing* and understand the implementations of *AAA Model* in the *Cloud*.

**CO5:** Introduce the broad perspective of *Mobile Cloud Computing*.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p><b>Era of Cloud Computing:</b> 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.</p> <p><b>Introducing Virtualization:</b> 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.</p>	12
II	<p><b>Cloud Computing Services:</b> Infrastructure as a Service, Platform as a Service, Language and Pass, Software as a Service, Database as a Service.</p> <p><b>Open Source Cloud Implementations and Administration:</b> Open-Source Eucalyptus Cloud Architecture, Open-Source Open Stack Cloud Architecture.</p>	12
III	<p><b>Application Architecture for Cloud:</b> 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.</p> <p><b>Cloud Programming:</b> Programming Support for Google Apps Engine, Big Table as Google's NOSQL System, Chubby as Google Distributed Lock Service, Programming Support for Amazon EC2, Elastic Block Store (ESB).</p>	12
IV	<p><b>Risks, Consequences and Costs for Cloud Computing:</b> Introducing Risks in Cloud Computing, Risk Assessment and Management, Risk of Vendor Lock-In, Risk of Loss Control, Risk of Not Meeting Regulatory Compliances, Risk of Resource Scarcity, Risk in Multi Tenant Environment, Risk of Failure, Risk of Failure of Supply Chain, Risk of Malware and Internet Attacks, Risk of Inadequate SLA , Risk of Management of Cloud Resources, Risk of Network Outages, Risks in the Physical Infrastructure, Legal Risk due to Legislation, Risks with Software and Application Licensing, Security and Compliance Requirements in a Public Cloud, Direct and Indirect Cloud Costs, Calculating Total Cost of Ownership for Cloud Computing, Cost Allocations in a Cloud.</p> <p><b>AAA Administration for Clouds:</b> The AAA Model, Single Sign-On for Clouds, Industry Implementations for AAA, Authentication Management in the Cloud, Authorization Management in the Cloud.</p>	12
V	<p><b>Application Development for Cloud:</b> Developing On-Premise Versus</p>	12

	<p>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.</p> <p><b>Mobile Cloud Computing:</b> Definition of Mobile Cloud Computing, Architecture of Mobile Cloud Computing, Benefits of Mobile Cloud Computing, Mobile Cloud Computing Challenges.</p>	
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Prescribed Text Book			
	Author	Title	Publisher
1	Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde & Dr. Deven Shah	Cloud Computing, Black Book	DreamTech Press

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

**Course Focus:** Employability

**Websites of Interest:**

1. <https://aws.amazon.com>
2. <https://portal.azure.com>

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**M.Sc.(Computer Science) Programme - IV Semester**  
**Course Code: 20CS4T3** **Title: Cloud Computing**  
**(w.e.f admitted batch 2020-21)**

**Time: 3 Hours**

**Max. Marks: 70**

**Answer ALL questions**

**(10×2 = 20 Marks)**

- 1) a) What is *Client-Server Architecture*? (CO1,L1)
- b) What are the differences between *Cloud Computing and Virtualisation*? (CO1,L1)
- c) Write about *DBaaS*. (CO2,L1)
- d) What is a *Cinder*? (CO2,L1)
- e) What is *EC2*? (CO3,L1)
- f) What is *GFS*? (CO3,L1)
- g) What is *risk* of using *Inadequate SLA*. (CO4,L1)
- h) Explain *SSO*. (CO4,L1)
- i) Write about *Static Code Analysis* for Cloud Applications. (CO5,L1)
- j) What is *Mobile Cloud Computing*? (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 *Various Types of Cloud* with neat diagrams. (CO1,L2) 10 M
- b) Compare and contrast *Cloud Computing Architecture* with *Peer to Peer Architecture*. (CO1,L2)  
10 M

(or)

- c) Explain *Virtualization* and its benefits and levels. (CO1,L2) 10 M
- d) Explain the *Virtualization Structures and Virtualization Mechanisms*. (CO1,L2) 10 M

Unit-II

- 3) a) Explain *Cloud Computing Services*. (CO2,L2) 10 M

(or)

- b) Explain *Open Source Cloud Architectures*. (CO2,L2) 10 M

Unit-III

- 4) a) Summarize the requirements of *Cloud Application*. (CO3,L2) 5 M  
b) Explain *Service Oriented Architecture* for Cloud Applications. (CO3,L2) 5 M  
(or)  
c) Explain the *Big Table* as Google's NoSQL System. (CO1,L2) 5 M  
d) Explain *Elastic Block Store*. (CO2,L2) 5 M

Unit-IV

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

Unit-V

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

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**M.Sc., (Computer Science) Programme - II Semester**

COURSE	COURSE CODE	L	T	P	C	Year
PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA	21CS4M1	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
<b>21CS4M1</b>	CO1	M			M	L		L
	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