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

NAAC - SSR IV CYCLE

MASTER OF COMPUTER APPLICATIONS (MCA)

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.C.A.

List of Courses

C CODE	COURSE TITLE	CREDITS	TOTAL	CIA	SEE
	MAY -2021 FIRST SEMESTER				
20CA1T1	PROBLEM SOLVING USING PYTHON PROGRAMMING	4	100	30	70
20CA1T2	COMPUTER ORGANIZATION	4	100	30	70
20CA1T3	SOFTWARE ENGINEERING	4	100	30	70
20CA1T4	DATABASE MANAGEMENT SYSTEMS	4	100	30	70
20CA1T5	DISCRETE MATHEMATICAL STRUCTURES	4	100	30	70
20CA1T6	PROBABILITY & STATISTICS	4	100	30	70
20CA1L1	PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	4	100	30	70
20CA1L2	DBMS LAB	4	100	30	70
20CA1S1	SEMINAR	1	50	50	-
	TOTAL	33	850	290	560
	OCTOBER-2021 SECOND SEMESTER				
20CA2T1	DATA MINING TECHNIQUES	4	100	30	70
20CA2T2	OPERATING SYSTEMS	4	100	30	70
20CA2T3	DATA STRUCTURES	4	100	30	70
20CA2T4	COMPUTER NETWORKS	4	100	30	70
20CA2T5	WEB TECHNOLOGIES	4	100	30	70
20CA2T6	TECHNICAL REPORT WRITING	1	50	50	-
20CA2L1	WEB TECHNOLOGIES LAB	4	100	30	70
20CA2L2	DATA STRUCTURES LAB	4	100	30	70
20OE01	**ENGLISH COMMUNICATION SKILLS (OPEN ELECTIVE)**	**4**	**100**	**30**	**70**
	TOTAL	29	750	260	490
	MARCH-2022 THIRD SEMESTER				
20CA3T1	BIG DATA & ANALYTICS	4	100	30	70
20CA3T2	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	4	100	30	70
20CA3T3	DESIGN & ANALYSIS OF ALGORITHMS	4	100	30	70
20CA3T4	CLOUD COMPUTING	4	100	30	70
20CA3T5	CRYPTOGRAPHY & NETWORK SECURITY	4	100	30	70
20CA3L1	BIG DATA & ANALYTICS LAB	4	100	30	70
20CA3L2	DATA MINING LAB	4	100	30	70
20OE09	**OPTIMIZATION TECHNIQUES (OPEN ELECTIVE)**	**4**	**100**	**30**	**70**
	TOTAL	28	700	210	490
	JULY-2022 FOURTH SEMESTER				
20CA4T1	DATA WRANGLING & DATA VISUALIZATION	4	100	30	70
20CA4T2	APPLIED DATA ANALYSIS	4	100	30	70
20CA4T3	DEEP LEARNING	4	100	30	70
20CA4M1	BLOCK CHAIN AND ITS APPLICATIONS (**MOOCS**)	4	100	30	70
20CA4P1	PROJECT WORK	6	200	100	100
	TOTAL	22	600	220	380

COURSE	COURSE CODE	L	T	P	C	Year
PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	20CA1L1	-	-	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.

    a. To calculate the distance between two points.

    b. To calculate the area of the circle.

4. WAP to perform addition, subtraction, multiplication, division, integer division, and modulo division on two integer numbers.

5. WAP to calculate the total amount of money in the piggybank, given the coins of Rs10,Rs 5, Rs 2 and Rs1.

6. WAP to calculate the bill amount for an item given its quantity sold, value, discount and tax.

7. WAP to calculate a students result based on two examinations,1sports event and 3 activities conducted. The weightage of activities=30 percent, sports=20 percent and examination=50 percent.

8. WAP to convert a floating point number into the corresponding integer.

9. A company decides to give bonus to all its employees on diwali. 5% bonus on salary is given to the male workers and 10% bonus on salary to the female workers.WAP to enter the salary of the employee and gender of the employee gets an extra2% bonus on salary .Calculate the bonus that has to be given to the employee and display the salary that the employee will get.

10. WAP to calculate tax given the following conditions:

    If income is less than 1,50.000 then no tax

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

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

    MIN1 = 150001

    MAX1= 300000

    RATE1 = 0.10

    MIN2 = 300001

MAX2=500000

RATE2=0.20

MIN3=500001

RATE3=0.30

11. WAP to calculate the roots of quadratic equation.

12. WAP to make a simple calculator.

13. WAP to print the calendar of any given year.

14. WAP to calculate simple interest .suppose the customer is a senior citizen. He is being offered 12% interest for all customers the ROI is 10% using functions.

15. WAP to display the date and time using the time module.

16. Write a python program to perform inheritance.

17. Write a Python program to perform exception handling.

18. WAP to demonstrate slice operation on string objects.

19. a. WAP to calculate fib(n) using a dictionary.

   b. to create a dictionary cubes of odd numbers in the range 1 to 10.

20. WAP to parse an emailed to print from which email server it was sent and when.

21. WAP to perform operations on stack.

22. WAP to perform read and write operations in files.

23. WAP that accepts filename as an input from an user open a file count a number of times a character appears in the file.

24. Write a program on modules.

25. Write a program to perform image operations.

26. Write a GUI for an expression calculator using tk.

27. Write a program to print text from the audio file. (Speech to Text and using   speech_recognization library).

28. Write a program to connect database and create a table using SQLite.

29. Write a program to perform insertion and selection operation using SQLite.

Activities: Coding Exercises.

COURSE	COURSE CODE	L	T	P	C	Year
DBMS LAB	20CA1L2	-	-	8	4	2020-21

Course Outcomes:

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

CYCLE-I

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

Table Name: Client- Master

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.
1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product_master table.
4. Find the names of sales man who have a salary equal to Rs.3000.
5. List the names of all clients having 'a' as the second letter in their names.
6. List all clients whose Bal due is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.
11. Find the products in the sorted order of their description.
12. Find the products with description as '540HDD' and 'Pen drive'.
13. Count the total number of orders.
14. Print the description and total qty sold for each product.
15. Calculate the average qty sold for each client that has a maximum order value of 15,000.
16. Find all the products whose quantity on hand is less than reorder level.
17. List the order number and day on which clients placed their order.
18. Find out the products and their quantities that will have to deliver in the current month.
19. Find the names of clients who have placed orders worth of 10000 or more.
20. Find the client names who have placed orders before the month of June,2018.

CYCLE-II

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

Part(Part_no, pname, color, weight, city, cost)
Shipment (supplier_No, Part_no, city)
JX(project_no, project_name, city)
SPJX (Supplier_no, part_no, project_no, city)

Solve the following queries by using above tables.
11. Get supplier numbers and status for suppliers in Chennai with status > 20.
12. Get project names for projects supplied by supplier S.
13. Get colors of parts supplied by supplier S_1.
14. Get part numbers for parts supplied to any project in Mumbai.
15. Find the id's of suppliers who supply a red or pink parts.
16. Find the pnames of parts supplied by London supplier and by no one else.
17. Get the names of the parts supplied by the supplier 'Mart' and 'Miller'.
18. Get supplier names for suppliers who do not supply part P_2.
19. Get all pairs of supplier numbers such that the suppliers concerned are "colocated".
20. Get suppliers names for the suppliers who supply at least one red part.

CYCLE-III

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

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

Solve the following queries by using above tables.
16. List the details of employees who have joined before the end of September' 81.
17. List the name of the employee and designation of the employee, who does not report to anybody.
18. List the name, salary and PF amount of all the employees (PF is calculated as 10% of salary)
19. List the names of employees who are more than 2 years old in the organization.
20. Determine the number of employees, who are taking commission.
21. Update the employee salary by 20% , whose experience is greater than 12 years.
22. Determine the department does not contain any employees.
23. Create a view, which contains employee name and their manager names working in sales department.
24. Determine the employees, whose total salary is like the minimum salary of any department.
25. List the department numbers and number of employees in each department.
26. Determine the employees, whose total salary is like the minimum salary of any department.
27. List average salary for all departments employing more than five people.
28. Determine the names of employees, who take highest salary in their departments.
29. Determine the names of employees, who earn more than their managers.
30. Display ename, dname, even if no employee belongs to that department (use outer join).

CYCLE-IV

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

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

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

k) Find the names of pilots whose salary is less than the price of the cheapest route from Newyork to Chicago.
l) 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.
m) 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.
n) Find the aid's of all aircraft than can be used from chicaga to LosAngels.
o) Find the name of the pilots certified from some Boeing aircraft.
p) Print the enames of pilots who can operate planes with cruising range greater than 3,500 miles, but are not certified by Boeing aircraft.
q) Find the eid's of employees who are certified for exactly 2 aircrafts.
r) Find the total amount paid to employees as salaries.
s) Find the aid's of all than can be used on non-stop flights from Chennai to Dubai.
t) Find the eid's of employee who make second highest salary.

PL/SQL PROGRAMS

17. Write a PL/SQL program to check the given number is strong or not.
18. Write a PL/SQL program to check the given string is palindrome or not.
19. Write a PL/SQL program to swap two numbers without using third variable.
20. Writ a PL/SQL program to generate multiplication tables for 2, 4, 6.
21. Write a PL/SQL program to check the given number is Amstrong or not.
22. Write a PL/SQL code to find the factorial of any number.
23. Write a PL/SQL program to display sum of even numbers and sum of odd numbers in the given range.
24. Write a PL/SQL program to check the given number is palindrome or not.
25. 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.
26. Write a PL/SQL program to display to 10 rows in Emp table based on their job and salary.
27. 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.
28. Write a procedure to update the salary of Employee, who are not getting commission by 10%.
29. 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)

30. 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)

31. Write a PL/SQL program to raise the employee salary by 10 %, who are completed ther 25 years of serviceand store the details at appropriate tables (Define the Retair_ Emp_Table).

32. 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 <
    60For 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

Activities: Coding Exercises

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

COURSE	COURSE CODE	L	T	P	C	Year
SEMINARS	20CA1S1	4	-	-	4	2020-21

Course Outcomes
CO1: Recall and define key concepts related to the presented computer technologies.(PO1)(PO5)(PO7)
CO2: Explain the fundamental principles and functionalities of the technologies covered in the seminars.(PO1)(PO5)
CO3: identify and analyze real-world applications of the presented technologies in various industries.(PO3)
CO4: Compare and evaluate different approaches or solutions within a chosen technology, considering their strengths and weaknesses,(PO4)(PO6)
CO6: Develop a concise presentation or written report on a chosen technology(PO3)

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO1	M				H		M
COURSE CODE	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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M.C.A., Programme - I Semester

COURSE	COURSE CODE	L	T	P	C	Year
PROBLEM SOLVING USING PYTHON PROGRAMMING	20CA1T1	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, RaisingExceptions, 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

Activities:Coding Excercises,QUIZ

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

Course Code: 20CA1T1   Title: PROBLEM SOLVING USING PYTHON PROGRAMMING
(w.e.f admitted batch 2020-21)

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

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

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

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

UNIT – I
2. A) Explain the features of Python Programming Language.(BTL2)
                    (OR)
    B) Explain *Different Types of Operators* in Python. (BTL2)

UNIT – II
3. A) Discuss *Basic Loop Structures* in Python with illustrations. (BTL6)
                    (OR)
    B) Explain Modules in Python with examples. (BTL2)

UNIT – III
4.   A) State built-in *String Methods* and *Functions* in Python.(BTL1)
                    (OR)
    B) Explain *Tuple Data Structure* in Python with examples. (BTL2)

UNIT – IV

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

(OR)

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

UNIT – V

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

(OR)

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

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTER ORGANIZATION	20CA1T2	4	-	-	4	2020-21

Course Outcomes:

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

UNIT I

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

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

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

UNIT II

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

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

UNIT III

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

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

UNIT IV

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

UNIT V

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

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

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

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

Activities:Quizzez,Tests,Group discussions

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

Course Code: 20CA1T2 **Title: COMPUTER ORGANIZATION**

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

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

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

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

Answer Five Questions Choosing One Question from Each Unit.

All Questions Carry Equal Marks. **(5×10 = 50 Marks)**
UNIT – I
2. A) What is *Flip flop*? Explain *different types of Flip flops* in detail. (BTL1)
                    (OR)
   B) Explain the *Fixed Point Representation* with an example. (BTL2)

UNIT – II
3. A) Explain *Logic Micro Operations* in detail. (BTL2)
                    (OR)
   B) What is *Instruction Cycle*? Explain various phases of *Instruction Cycle*. (BTL1)

UNIT – III
4. A) Describe the design of Control Unit. (BTL2)
                    (OR)
   B) Explain various *Addressing Modes*. (BTL2)
UNIT – IV
5. A) What is *BCD Added* ? Explain in detail. (BTL1)
                    (OR)
   B) Explain *Booth's Multiplication Algorithm* with example. (BTL2)

UNIT – V
6. A) Explain different *Modes of Data Transfers*. (BTL2)
                    (OR)
   B) What is *Cache Memory*? Discuss various *Mapping Procedures* of Cache
      Memory. (BTL1)

COURSE	COURSE CODE	L	T	P	C	Year
SOFTWARE ENGINEERING	20CA1T3	4	-	-	4	2020-21

Course Outcomes:

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

UNIT I

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

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

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

UNIT II

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

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

UNIT III

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

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

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

UNIT IV

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

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

UNIT V

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

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

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

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

Activities:Quizzez,Tests,Group discussions,use cases

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
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M.C.A., Programme - I Semester

Course Code: 20CA1T3   Title: SOFTWARE ENGINEERING

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

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

Answer ALL questions   **(10×2 = 20 Marks)**
1. a) Define *Software Engineering*. (BTL1)
   b) What is *PSP & TSP*? (BTL2)
   c) Write any two key features of *Class-Responsibility-Collaborator (CRC)* Modeling.
                                                              (BTL1)
   d) State any two *Deployment Principles*. (BTL1)
   e) What is *Software Reliability*? (BTL1)
   f) Describe the *Arts of Debugging*. (BTL2)
   g) What are the aspects to be considered while testing *Object Oriented Software*? (BTL1)
   h) Write any two *W5HH Principles*. (BTL1)
   i) State various *Resources* while estimating the *Software Projects*. (BTL1)
   j) What is *State Box?* (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks.   **(5×10 = 50 Marks)**
UNIT – I
2. A) What is *Myth*? State various myths of *Software Myths*. (BTL1)
                              (OR)
   B) Describe any two *Prescriptive Process Models*. (BTL2)

UNIT – II
3. A) State *(i) Communication and (ii) Planning* Principles. (BTL1)
                              (OR)
   B) Describe *Scenario-Based Modeling* in detail. (BTL2)

UNIT – III
4. A) Discuss the testing strategies to test *Conventional Software*. (BTL2)
                              (OR)
   B) What is *White Box Testing*? Explain in detail.(BTL1)

UNIT – IV
   A) Discuss the *Management Spectrum* in detail. (BTL6)
                              (OR)
   B) Explain (i) *Size-Oriented Metrics* and (ii) *Function-Oriented Metrics* in detail. (BTL2)

UNIT – V
5. A) Explain *Functional Specification* of *Cleanroom Strategy*. (BTL2)
                              (OR)
   B) Describe *(i) The COCOMO II Model* and *(ii) The Software Equation* of Empirical
      Estimation Models. (BTL2)

COURSE	COURSE CODE	L	T	P	C	Year
DATABASE MANAGEMENT SYSTEMS	20CA1T4	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, 1st, 2nd and 3rd normal forms, Boyce-Codd Normal Form. Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal.

UNIT IV

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

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B^+-Trees.

UNIT V

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

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

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

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

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

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M.C.A., Programme - I Semester

Course Code: 20CA1T4   Title: DATABASE MANAGEMENT SYSTEMS

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

Time: 3 Hours   Max. Marks: 70

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

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

UNIT – I
2. A) What is DBMS? Explain advantage of DBMS. (BTL1)
   (OR)
   B) Explain *Three Schema Architecture* of DBMS with neat diagram. (BTL2)

UNIT – II
3. A) What is Constraint? Explain various *Constraints* of the Relational Model. (BTL1)
   (OR)
   B) Describe *SELECT & PROJECT* Operations of Relational Algebra. (BTL2)

UNIT – III
4. A) What is *Generalization*? Explain with example. (BTL1)
   (OR)
   B) What is *BCNF*? Explain with example. (BTL1)

UNIT – IV
5. A) What is Hashing? Describe *Internal & External* Hashing Techniques. (BTL1)
   (OR)
   B) What is B-Tree? Construct B-Tree for the values 10, 20, 30, 40, 50, 60, 70, 80, 90 of order 3. (BTL1)

UNIT – V
6. A) Explain *Concurrency Control Based on Timestamp Ordering*. (BTL2)
   (OR)
   B) Explain *Distributed Database Concepts* in detail. (BTL2)

COURSE	COURSE CODE	L	T	P	C	Year
DISCRETE MATHEMATICAL STRUCTURES	20CA1T5	4	-	-	4	2020-21

Course Outcomes:

On successful completion of this course, the students:
1. Understand *Mathematical Reasoning* in order to construct *Mathematical Arguments*. (CO1)
2. Perform *Combinatorial Analysis* to solve *Computing Problems* and *Analyze Algorithms*. (CO2)
3. Know the *Abstract Mathematical Structures* used to represent *Discrete Objects* and *Relationships between Objects*. (CO3)
4. Solve *Model Problems* in Computer Science using *Graphs* and *Trees*. (CO4)
5. Apply the *Principles* to solve problems in *Various Domains*. (CO5)

UNIT I

The Foundations: Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Normal Forms, Proof Methods and Strategy, Program Correctness.

Basic Structures: Sets, Functions, Sequences and Sums: Sets, Set Operations, Functions, Recursive Functions, Sequences and Summations.

The Fundamentals: Algorithms, The Integers and Matrices: Algorithms, The Growth of Functions, Complexity of Algorithms, The Integers and Divisions, Primes and Greatest Common Divisors, Integers and Algorithms, Applications of Number Theory, Matrices.

UNIT II

Introduction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.
Counting: The Basics of Counting, The Pigeon Hole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.

UNIT III

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion, Exclusion, Applications of Inclusion & Exclusion.

Relations: Relations and their Properties, N-ary Relations and their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT IV

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism's, Connectivity, Euler and Hamilton Paths, Shortest Path Problems, Planar Graphs, Graph Coloring.

UNIT V

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Boolean Algebra: Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits.

Prescribed Text Book			
	Author	Title	Publisher
1	Kenneth H Rosen, KamalaKrithivasan	Discrete Mathematics and its Applications with Combinator ICS & Graph Theory	7th Edition, Tata McGraw-Hill (2011), Special Indian Edition.

Reference Books			
	Author	Title	Publisher
1	Ralph P. Grimaldi, B.V. Ramana	Discrete and Combinational Mathematics	5th Edition, Pearson Education (2008).
2	Swapan Kumar Sarkar	A Text Book of Discrete Mathematics	S.Chand (2008)
3	D.S.Malik and M.K.Sen	Discrete Mathematical Structures	Thomson (2006)

Activities: Quizzes
,Tests,Group discussions

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M.C.A., Programme - I Semester

Course Code: 20CA1T5   Title: DISCRETE MATHEMATICAL STRUCTURES

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

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

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

1. a) What is a *Proposition*? (BTL1)
   b) Write quantified expression for the statement *"Every student in your class hastaken a course in calculus".* (BTL1)
   c) What is *Well Ordering Property*? (BTL1)
   d) State the *Pigeon Hole Principle*. (BTL1)
   e) What is *Principle of Inclusion and Exclusion*? (BTL1)
   f) Define *Equivalence Relation*. (BTL1)
   g) Write *Adjacency Matrix* for the following Graph. (BTL1)
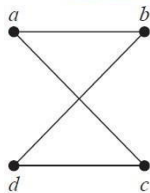
   h) Define Chromatic Number. (BTL1)
   i) Define *Spanning Trees*. (BTL1)
   j) Minimize the Boolean Expression F = x $\bar{y}$ z + x y z using Boolean Laws. (BTL6)

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

2. A) Prove the relation $\left(p \supset q\right) \supset \left(\bar{p} \supset r\right) \supset \left(p \supset r\right)$ is *Tautology*. (BTL5)
   B) Use *Set Builder Notation* prove the *Demorgans Laws*. (BTL3)
   $\overline{A \cap B} = \bar{A} \cup \bar{B}, (ii) \overline{A \cup B} = \bar{A} \cap \bar{B}$
                              OR

C) Define (i) *Biconditional Statement* $(\square)$ (ii) *Exclusive OR* $(\square)$ (iii) *ConditionalStatement* $(\square)$ with the *Truth Tables*. (BTL1)

UNIT – II

3. A) What is the expansion of $(2x+3y)^4$ using *Binomial Theorem* and find the coefficientof $x^{12} y^{13}$ in the expansion of $(x+y)^{25}$ (BTL1)

OR

B) Find the values of following (BTL1)

(i) C (12, 6) (ii) C (30, 6) (iii) P (10, 9) (iv) P (15, 5)

UNIT – III

4. A) Solve the recurrence relation $a_n - 3a_{n-1} - 4a_{n-2} = 3^n$ given $a_0 = 1, a_1 = 2$. (BTL6)

OR

B) State the *Properties of Relations* and explain clearly with examples. (BTL1)

UNIT – IV

5.A) Define *Isomorphism* between two *Graphs*. Explain the methods to check whetherthe *Graphs* are *Isomorphic* or *Not* with an example. (BTL1)

OR

B) Explain the *Dijkstra's Algorithm* to find a *Shortest Path* with an example. (BTL2)

UNIT – V

6.A) Explain how to produce *Minimum Spanning* tree using *Prim's Algorithm* with anExample. (BTL2)

OR

B) Use *Karnaugh Maps* to minimize these *Sum-of Products* expansions.(BTL3)

1. $x\,y\,\overline{z} + x\,\overline{y}\,\overline{z} + \overline{x}\,\overline{y}\,\overline{z}$

2. $x\,\overline{y}\,z + x\,\overline{y}\,\overline{z} + \overline{x}\,y\,z + \overline{x}\,\overline{y}\,z + \overline{x}\,\overline{y}\,\overline{z}$

3. $x\,y\,\overline{z} + x\,\overline{y}\,\overline{z} + \overline{x}\,\overline{y}\,z + \overline{x}\,\overline{y}\,\overline{z}$

COURSE	COURSE CODE	L	T	P	C	Year
PROBABILITY AND STATISTICS	20CA1T6	4	-	-	4	2020-21

Course Outcomes:
On successful completion of this course, the students:
1. Understand *Theory of Probability*, *Random Variables and Distribution-Functions*.(CO1)
2. Apply *Mathematical Expectation and Generating Functions*, *Probability Distributions-Discrete Probability Distributions* and *Distribution-Functions (Cumulative Distribution Function*.(CO2)
3. Apply *Correlation Analysis* and *Regression Analysis*.(CO3)
4. Apply *Test of Hypothesis*, *Large Sample Tests* and *Small Sample Tests-I*. (CO4)
5. Apply *Small Sample Test- Chi-Square* and *F- Distributions* and *Analysis of Variance*: (CO5)

UNIT I

Theory of Probability: Axiomatic Approach to Probability, Law of Addition of Probabilities, Multiplication Law of Probability and Conditional Probability, Bayes Theorem and Simple Problems.
Random Variables: Discrete Random Variable-Definition, Properties, Probability Mass Function and Simple Problems, Continuous Random Variable-Definition, Properties, Probability Density Function and Simple Problems.
Distribution-Functions (Cumulative Distribution Function): Distribution Function-Discrete Random Variables, Distribution Function-Continuous Random Variables, Properties of Distribution Function, Simple Problems.

UNIT II

Mathematical Expectation and Generating Functions: Mathematical Expectation, Properties of Mathematical Expectation, Variance and Co-variance, Properties Of Variance and Co-variance.
Probability Distributions-Discrete Probability Distributions: Binomial Distribution-Definition, Properties and Applications of Binomial Distributions, Simple Problems, Poisson Distribution-Definition, Properties and Applications of Binomial distribution, Simple Problems.
Probability Distributions-Continuous Probability Distributions: Normal Distribution-Definition, Properties and Applications of Normal Distribution, Simple Problems using Area Property, The Exponential Distribution-Definition, Properties and Applications of Exponential Distribution, Weibul Distribution-Definition, Properties and Applications of Weibul Distribution.

UNIT III

Correlation Analysis: Correlation-Definition, Types of Correlation, Methods of Studying Correlation: Scatter Diagram, Karl Pearson Coefficient of Correlation, Spearman's Rank correlation, Properties of Coefficient of Correlation, Simple Problems- Bivariate Distribution-Ungrouped Data and using Properties.

Regression Analysis: Lines of Regression, Regression Coefficients, Properties of Regression Coefficients, Simple problems-Bivariate Distribution-Ungrouped Data and using Properties

UNIT IV

Test of Hypothesis: Populations and Samples, Statistical Hypothesis-Null and Alternative Hypothesis, Level of Significance, Type I and Type II errors, One Tail, Two-Tail Tests, Procedure for Test of Significance.
Large Sample Tests: Test Based on the Normal Distribution-Z-Test for Single Mean, Difference of Means, Single Proportion, Difference of Proportions and Simple Problems.
Small sample Tests-I: T-Test: T-Distribution-Properties and Applications,   T-Test for Single Mean, Difference of Means, Paired T-Test and Simple Problems.

UNIT V

Small Sample Test- Chi-Square and F- Distributions:. Chi-Square Distribution-Properties and Applications, Chi-Square Test of Goodness of Fit and Independence of Attributes, F-Distribution-Properties and Applications, F-Test for Difference of two Population Variances.
Analysis of Variance: One Way Classification, Two-way Classification, ANOVA Table, Simple Problems.

Prescribed Text Books

	Author	Title	Publisher
1	Dr.J.Ravichandran	Probability & Statistics for Engineers	Wiley India Pvt. Limited, 2010
2	E.Rukmagadachar&E.keshava Reddy	Probability &Statistics	Pearson Publisher

Reference Text Books

	Author	Title	Publisher
1	S.C.Gupta, V.K.Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand, 11/e, 2002
2	S.C. Gupta and V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons; Fourth edition (2014), New Delhi

Activities: Quizzez,Tests Maths Problems

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
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M.C.A. , I Semester
Course Code: 20CA1T6   **Title: PROBABILITY AND STATISTICS**

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

Time: 3 Hours   **Max. Marks: 70**
                              SECTION - A

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

1. a) Define *Conditional Probability* with example. (BTL1)
   b) What are the properties of *Distribution Function*? (BTL1)
   c) Define *Mathematical Expectation*. (BTL1)
   d) Write applications of *Weibul Distribution*. (BTL1)
   e) What is *Spearmen's Correlation*? (BTL1)
   f) Why we are using two *Regression Lines*? (BTL1)
   g) Define types of errors in *Testing of Hypothesis*. (BTL1)
   h) Explain *One Tail* and *Two Tail* test. (BTL2)
   i) Write conditions for *Chi-square Test*. (BTL1)
   j) What are assumptions of ANOVA? (BTL1)

SECTION – B

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

UNIT – I

2. A) Three factories produce light bulbs to supply the market. Factory A produces 20%, 50% of the tools are produced in factories B and 30% in factory C.2% of the bulbs produced in factory A, 1% of the bulbs produced in factory B and 3% of the bulbs produced in factory C are defective. A bulb is selected at random in the market and found to be defective. What is the probability that this bulb was produced by factory B? (BTL3)

(OR)

   B) A random variable X has the following probability distribution

X	0	1	2	3	4	5	6	7	8
P(X)	k	3k	5k	7k	9k	11k	13k	15k	17k

   Determine (i) k (ii) P (x < 3) (iii) P (X ≥ 3) (iv) P (0 < x < 5)
         (v) Find distribution function. (BTL5)

UNIT – II

3. A) If 2% of mobile phones of a company are defective, find the probability that at least (i) one defective (ii) exactly 7 defective (iii) at most 8 defectives in a sample of 100. (BTL1)

(OR)

   B) The life of LED bulbs of a certain type may e assumed to be normally distributed w i t h mean 155 hours and standard deviation 19 hours.

Determine the probability that the life of a randomly chosen bulb is (i) between 136 hours and 174 hours (ii) less than 117 hours (iii) will be more than 395 hours.
(BTL5)

UNIT – III

4. A) In a partially destroyed laboratory, record of an analysis of correlation data, the Following results only are legible: Variance of $X = 9$, Regression equations: 8X-10Y+66=0, 40X-18Y=214. What are the mean values X and Y, and the correlation coefficient between X and Y, Also find the standard deviation of Y? (BTL1)

(OR)

B) Obtain the correlation coefficient for the following data (BTL1)

X	63	59	70	45	59	75	70	35	50	69
Y	57	53	63	40	76	55	63	43	45	65

UNIT – IV

5. A) In a hospital 480 females and 520 male babies were born in a week. Does these figures confirm the hypothesis that males and females are born in equal number? (BTL3)

(OR)

B) The weights of 10 people before and after practicing the diet to verify if there is any statistical difference. The weights are shown in the table below. (BTL3)

Before Diet	50	74	65	80	66	58	49	54	71	55
After Diet	52	70	58	79	66	55	47	55	60	52

UNIT – V

6. A) In a sample of 8 observations, the entirety of squared deviations of things from the mean was 94.5. In another specimen of 10 perceptions, the worth was observed to be 101.7 Test whether the samples are drawn form same norml opulation at 5% level. (BTL4)

(OR)

B) Three different machines are used for a production. On the basis of the outputs ,test whether the machine are equally effective. (BTL4)

OUTPUTS				
Machine I:	10	5	11	10
Machine II:	9	7	5	6
Machine III:	20	16	10	4

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

COURSE	COURSE CODE	L	T	P	C	Year
WEB TECHNOLOGIES LAB	20CA2L1	-	-	8	4	2020-21

Course Outcomes:

At the end of the course the student:

1. Able to build functional web applications HTML. (CO1)
2. Use JavaScript, VBScript and DHTML for web designing. (CO2)
3. Code using XML and PHP for integrating with web pages. (CO3)
4. Create dynamic web pages wherein client interaction is facilitated using advanced server technology like JSP. (C04)
5. Integrate offline data storage, background processes and APIs using database connectivity and ASP. (CO5)

HTML:

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

II MCA	Pass percenetage=95%
	Fail percentage=5%
III MCA	Pass percenetage=97%
	Fail percentage=3%

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

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.

Login name:

Enter Password:

Reenter Password:

Birthdate:

Sex: Female
       Male

Enter Address

Enter qualification

| Login | Login | clear | clear |

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

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

13. Develop a script to find the duplicate elements of an array.
14. Develop a script which generates a different greeting each time the script is executed.
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.
16. Develop a java script code that accepts user name and password from user, Check their correctness and display appropriate alert messages.

VB Script:

17. Develop a script that takes input from user and displays the same in upper case and lowercase.
18. Develop a program to implement cookies in VB Script.

DHTML:

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

XML:

24. 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.
25. Create a internal DTD file.
26. Create an external DTD file.
27. Create a XSLT style sheet to display the student data as an HTML table.

PHP:

28. Find the factorial of a given number using PHP declarations and expressions.
29. Develop a PHP program that interacts with the user .Collect first name last name and date of birthand displays that information back to the user.

JSP:

30. Develop a program to implement JSP directives.
31. Develop a JSP program for session tracking.

ASP:

32. Develop an Asp program to change the background of a page based on the user's choice.
33. Develop an Asp Program to retrieve data from students table.
34. Develop an Asp program to insert data into student table.

Activities: Quizzez,Tests, Group discussion., Mini Projects, App development.

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University)
M.C.A., Programme - II Semester

COURSE	COURSE CODE	L	T	P	C	Year
DATA STRUCTURES LAB	20CA2L2	-	-	8	4	2020-21

Course Outcomes:
On successful completion of this course, the students:
1. Understands the concepts of Stacks, Queues, and Tree Traversals.(CO1)
2. Apply the operations of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists and Operations onStacks and Queues. (CO2)
3. Apply operations on Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFSAlgorithm. (CO3)
4. Implement Searching & Sorting Algorithms. (CO4)
5. Implement AVL-Trees and B-Trees. (CO5)

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

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

CYCLE 3
1. Write a Java Program to implement operations on Binary Trees
    Using Recursive and Non-Recursive Methods.
2. Write a Java Program to perform Binary Search Tree Traversal.
3. Write a Java Program to implement Sparse Matrix.
4. Write a Java Program to implement DFS Algorithm.
5. Write a Java Program to implement BFS Algorithm.
CYCLE 4
1. Write a Java Program to implement the following sorting techniques:
   a. Bubble Sort   b. Merge Sort.   c. Quick Sort.   d. Heap Sort.
2. Write a java program to implement Quick Sort of given elements.
3. Write a Java Program to implement the Following search techniques:
    a. Linear Search   b. Binary Search
CYCLE 5

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

Activities: Quizzes, Coding Tests,Group discussions

COURSE	COURSE CODE	L	T	P	C	Year
DATA MINING TECHNIQUES	20CA2T1	4	-	-	4	2020-21

Course Outcomes:
On successful completion of this course, the students:
1. Understand the basics of data mining and data pre-processing techniques. (CO1)
2. Aware of constructing the data warehouse, OLAP and relevant data model concepts.(CO2)
3. understand the Frequent Itemset Mining Methods and different levels in association rules (CO3)
4. understand the basic concepts in classification and advanced classification methods by implementing various algorithms.(CO4)
5. Should be able to find the similarities among the data using clustering algorithms and outlier analysis.(CO5)

UNIT I

Introduction: What is Data mining? , What Kind of Data can be mined, what kinds of Patterns can be mined, Major Issues in Data Mining**.**

Data Preprocessing: Data Preprocessing :An Overview,Data Cleaning, Data Integration, Data Reduction-Overview of Data Reduction Strategies, Attribute Subset Selection, Regression and log linear Models. Histograms and clustering, Data Transformation- Data Transformation strategies Overview, Data Transformation by Normalisation, Discretization by Binning.

UNIT II

Data Warehousing and OLAP: Data warehouse: Basic Concepts **-**What Is a Data Warehouse?, Difference between Operational Database Systems and Data Warehouses, Why have a separate Data warehouse?, Data Warehousing:A Multiered Architecture, Data warehouse Models, Extraction, transformation and loading, Metadata Repository ,Datawarehouse Modeling: Datacube and OLAP- A Multidimensional Data Model -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,

UNIT III

Mining Frequent patterns, Associations: Basic concept- Market basket analysis: A Motivational Example, Frequent Itemsets, closed itemsets and Association Rules, Frequent itemset Mining Methods

Advanced Pattern Mining:
Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space-Mining Multilevel association rules, Mining Multi Dimensional Associations, Mining Quantitative Association Rules.

UNIT IV

Classification: Basic Concepts:
Basic concepts-What Is Classification? General Approaches to classification, Decision tree Induction-Decision tree induction, Attribute selection measures, tree pruning, Scalability and Decision Tree Induction, Bayes Classification Methods - Bayes Theorem, Navie Bayesian classification.

Classification: Advanced Methods:

Bayesian Belief Networks-Concepts and mechanisms, Training Bayesian Belief Networks Classification by Back Propagation.

UNIT V

Cluster Analysis Introduction: What is Cluster Analysis? Requirements for Cluster Analysis, A Partitioning Methods-k-means,K-medoid, Hierarchical Methods- Agglomerative versus Divisive Hierarchical clustering, Distance measures in Algorithmic methods, BRICH: Multiphase hierarchical Clustering using Clustering Feature Trees, Chameleon Hierarchical Clustering, Density Based Methods: DBSCAN.

Outlier Detection:
What are Outliers Analysis? Types of outliers, challenges of outlier Detection.

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

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

Activities:Quizzez,Tests,Group discussions

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M.C.A., Programme - II Semester

Course Code: 20CA2T1   Title: DATA MINING TECHNIQUES

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

Time: 3 Hours   Max. Marks: 70

Answer ALL questions   (10×2 = 20 Marks)
1. a) Difference between *Data Mining* and *KDD*(BTL4)
   b) What is meant by *Data Preprocessing*? (BTL1)
   c) Define *Multidimensional Data model*. (BTL1)
   d) OLAP versus OLTP (BTL4)
   e) Give one example for *Closed Itemset* and *Maximal Frequent Itemset* (BTL1)
   f) What is meant by Association Rule? (BTL1)
   g) Explain *Bayes Theorem.* (BTL2)
   h) Define *Classification* with Example. (BTL1)
   i) What are the requirements of *Cluster Analysis*? (BTL1)
   j) What is meant by *Outliers*? (BTL1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks.   (5×10 = 50 Marks)
UNIT – I
2. A) Define Data Mining. What kinds of Patterns can be mined in Data Mining. (BTL1)
                              (OR)
   B) Define Data Integration. What are the Different Techniques used in Data Integration. (BTL1)

UNIT – II
3. A) Define Data warehouse. Explain Data Warehouse Architecture with neat Diagram. (BTL1)
                              (OR)
   B) What are the different types of Schemas used in Multi Dimensional Data Model? (BTL1)

UNIT – III
4. A) Explain Aprior Algorithm with Example. (BTL2)
                              (OR)

B) Explain about Multi Level and Multi Dimensional Association rules with Examples. (BTL2)

UNIT – IV

5.   A) What is Decision Tree? Explain Decision Tree Induction Algorithm with Example. (BTL1)

(OR)

B) Explain Classification by Back Propagation with algorithm and Example. (BTL1)

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

(OR)

B) Explain Chameleon Hierarchical Clustering and
   DBSCAN in Density BasedMethod. (BTL2)

COURSE	COURSE CODE	L	T	P	C	Year
OPERATING SYSTEMS	20CA2T2	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, 9th 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)

Activities: Quizzez,Tests,Group discussions,assignments.

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M.C.A., Programme – II Semester

Course Code: 20CA2T2   **Title: OPERATING SYSTEMS**

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

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

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.C.A., Programme - II Semester

COURSE	COURSE CODE	L	T	P	C	Year
DATA STRUCTURES	20CA2T3	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 ofGraphs, Operations on Graphs, Traversing a Graph, Topological Sorting.
Sorting and Searching: Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and DataModification, 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

Activities:Quizzez,Tests,Group discussions

**P.B.Siddhartha College of Arts & Science,
Vijayawada - 520 010. (An Autonomous
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University)M.C.A., Programme – II Semester
Course Code: 20CA2T3   Title:
DATA STRUCTURES
(w.e.f admitted batch 2020-
21)**

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

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. **(5×10 = 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)

COURSE	COURSE CODE	L	T	P	C	Year
COMPUTER NETWORKS	20CA2T4	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 **Chapters:** 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

Activities:Quizzez,Tests,Group discussions

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A., Programme - II Semester
Course Code: 20CA2T4 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)

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

COURSE	COURSE CODE	L	T	P	C	Year
WEB TECHNOLOGIES	20CA2T5	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 1. 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).

Activities:Quizzez,Tests,Group discussions

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A., Programme - II Semester
Course Code: 20CA2T5 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 *Scriplets*? (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 auser and validate them. (BTL2)

Or

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

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

.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.

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

COURSE	COURSE CODE	L	T	P	C	Year
MOBILE APPLICATION DEVELOPMENT	21OE02	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								
COURSE CODE	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO1		L		M	H		
	CO2			M	M	H		
	CO3	M			M		L	L
	CO4	H		H		H	L	
	CO5	H		H		H		L

Unit 1	**Getting Started with Android Programming:** 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. **Using Android Studio for Android Development**: Exploring the IDE, using code completion, Debugging your Application, Publishing your application.
Unit 2	**Understanding Activities**: Life cycle of an Activity, Applying Styles and Themes to activity, Hiding Activity Title, Displaying Dialog window, Progress Dialog. **Link Activities using Intents**: Returning results from an Intent, Passing data using Intent object **Fragments**: Adding Fragments Dynamically, Life cycle of fragments, Interactions between fragments, understanding the Intent object, Intent filters.

1

Unit 3	**Getting to know the Android User Interface**: 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. **Designing User Interface with Views** : Using Basic Views, Picker Views, List Views, List Fragment, Dialog Fragment, Preference Fragment , using Image Views, using Menus, using web view
Unit 4	**Data Persistence** : Saving and Loading user preferences, Persisting data to Files, Creating and Using Databases **Content Providers** : Sharing Data In Android, Using Content Provider, Creating And Using Your Own Content Providers **Multimedia** : Playing Audio and Video, Recording Audio, Recording Video
Unit 5	**Telephony Exploring Telephony background and terms** — Accessing telephony information — Interacting with Phone - working with SMS Messaging **Notifications and Alarms** : Introducing Toast, Placing your Toast message, Making a custom toast, Introducing Notifications, Making custom Notifications, Introducing Alarms — Creating a simple alarm example. Email and Location Based Services — Sending Email , Displaying Maps , Getting Location Data, Monitoring a Location

Text books:

	Author	Title	Publishers
1	Beginning 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 innners	Manchester Academic Publishers

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010
Autonomous -ISO 9001 – 2015 Certified

Programme: Master of Computer Applications
Title of the Paper: Big Data and Analytics Lab
Semester: III

Course Code	20CA3L1	Course Delivery Method	Face-to-face/Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	8	Semester End Exam Marks	70
Total Number of Lecture Hours	96	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). (CO2,L2)

5. Experimenting *Map Reduce Program* that mines *Weather Data*. (Java / Python). (CO2,L3)

6. Demonstration *Apache Pig Installation*. (CO4,L2)

7. Apply Basic Operations on Apache Pig (*Load, Foreach..Generate, Group, Join, Dump / Store.)* (CO4,L3)

8. Apply Operations (Create, Alter, and Drop) on Hive *Databases, Tables, Views, Functions*, and *Indexes*. (CO4,L3)

9. Illustration of *MongoDb* installation. (CO3,L3)

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,L6)

19. Create *Dual Axis / Shared Axis* in Tableau. (CO5,L6)

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.

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010.
NAAC reaccredited at 'A+' level
Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A
Title of the Paper: Data Mining Lab
Semester: III

Course Code	20CA3L2	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. Crate 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 **/ E**mployability / **S**kill Development.

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A

Title of the Paper: Big Data and Analytics

Semester: III

Course Code	20CA3T1	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: To understand *Big Data and Analytics*, To gain knowledge on *Hadoop Distributed File System* and *Hadoop Eco system*, To know *Processing Data with Hadoop Environment*, To implement *Map Reduce Operations*,   To implement *NoSQL Databases (MongoDB)*, To understand *Hadoop Eco System components (Hive, Apache PIG and Hbase)*, To know *Basic Visualization using Tableau*, *Extracting Data*, *Data Blending*, *Creating Charts*.

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

CO1: Understand *Big Data*, *Importance of Big Data* and *Challenges in Big Data Implementation*.

CO2: Understand the *Distribution Computing Challenges (HDFS)*, *Hadoop Environment and Hadoop Eco System.*

CO3: Process *Data with Hadoop*, *Map Reduce Programming* and   *MongoDb*.

CO4: Understand the *Hadoop Eco System* (HIVE, Hbase and Apache PIG).

CO5: Extract *Data*, *Data Blending* and *Connecting Various Data Sources* and *Use them* in *Data Visualization*.

Syllabus		
Unit	Learning Units	Lecture Hours
I	Types of Digital Data: Classification of Digital Data. Introduction to Big Data: Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data?, 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 Isn't?, 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.	12
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.	12
III	Processing Data with Hadoop, Managing Resource and Applications with Hadoop with YARN (Yet Another Recourse Negotiator), Interfacing with Hadoop Ecosystem. 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 versus NoSQL. MongoDB: What is MongoDB, Why MongoDB, Using JavaScript, Script Object Notation, Generating Unique Key, Support for Dynamic Queries, Storing Binary Data, Relication, Sharding, Updating Information in Place, Terms used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language?	12
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 vs RDBMS	12
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	12

	Extracting Data, Data Blending, Moving from Test to Production Databases (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 2nd edition	Wiley Publications. (Unit I, II, III,IV)
2	George Peck	Tableau 9 - The official Guide	Mcgraw hill - 2016

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.

Reference Text Book			
	Author	**Title**	**Publish er**
1	Tom White	Hadoop: The Definitive guide	O'Reilly 4e
2	Nathan, Marz James Warren	Big Data Principles and Best Practices of Scalable Real Time Data Systems	MANNING Publications 2015
3	Stirrup,Nandeshwar,Ohmann,Floyd	Tableau: Creating Interactive Data Visualizations	Packt Publishing 2016
4	Visual Analytics with Tableau	Alexander Loth	Wiley 2019
5	Data Analytics and Visualization in Quality Analysis Using Tableau	Jaejin Hwang and Youngjin Yoon	CRC Press-Taylor & Francis Group

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A Programme - III Semester
Course Code: 20CA3T1   Title: Big Data and Analytics
(w.e.f admitted batch 2020-21)

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

1)   a) How to Deal with Unstructured Data? (CO1,L1)
        b) Write short notes on vertical scaling and horizontal scaling. (CO1,L1)
        c) What is the role of Data Scientist? (CO2,L1)
        d) What is Brewers theorem? (CO2,L1)
        e) What is the role of combiner in Map-reduce? (CO3,L1)
        f) What are advantages and disadvantages of NoSQL*?* (CO3,L1)
        g) State any two Hive storage formats. (CO4,L1)
        h) What is role of zoo keeper in *Hbase?* (CO4,L1)
        i) What is is role of Apache pig in Hadoop Ecosystem *?* (CO5,L1)
        j) State join techniques in Tableau . (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 V's in BigData. (CO1,L2) 10 Marks
                                    (or)
     b) Explain Top challenges facing Big Data. (CO1,L2) 10 Marks

UNIT II
3) a) *Explain architecture of HDFS with neat diagram*. (CO2,L2) 10 Marks
                                    (or)
   b) Illustrate Hadoop eco-system with neat diagram (CO2,L2) 10 Marks

UNIT III
4) a) Explain Map-Reduce framework with suitable examples. (CO3,L5) 10 Marks
                                    (or)
    b) Explain CRUD operations in MongoDB with examples   (CO3,L5)   5 Marks
    c) Explain exporting and importing of JSON files in MongoDB with examples (CO3,L5) 5 Marks

UNIT IV
5) a) Explain Hive architecture with neat diagram (CO4,L5) 10 Marks
                                    (or)
    b) Illustrate Anatomy of apache PIG. (CO4,L5) 10 Marks

UNIT V
6)   a) Discuss the process of data blending in Tableau with example (CO5,L6) 10 Marks
                                    (or)
     b) Explain the process of creating any four charts in Tableau with examples. (CO5,L5) 10 Marks

Programme: M.C.A
Title of the Paper: Artificial Intelligence & Machine Learning
Semester: III

Course Code	20CA3T2	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	**Introduction:** What Is AI? The Foundations of Artificial Intelligence, The History of Artificial Intelligence. **Solving Problems by Searching:** Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.	10
II	**First-Order Logic:** Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic. **Inference in First-Order Logic:** Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.	10
III	**Classical Planning:** Definition of Classical Planning ,Algorithms for Planning as State-Space Search, Planning Graphs, Other Classical Planning Approaches, Analysis of Planning Approaches. **Knowledge Representation:** Ontological Engineering, Categories and Objects Events, Mental Events and Mental Objects.	15
IV	**Learning from Examples:** Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models. **Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.	15
V	**Artificial Neural Networks:** 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. **Instance-Based Learning:** Introduction, K-Nearest Neighbour Learning, Radial Basis Functions, Case-Based Reasoning.	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.

Reference Text Book			
	Author	**Title**	**Publisher**
1	Winston. P.H	Artificial Intelligence	Addison Wesley (1993)
2	Peter Flach	Machine Learning The Art and Science of Algorithms that Make Sense of Data	Cambridge University 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
4. https://machinelearningmastery.com/basic-concepts-in-machine-learning/

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M.C.A. Programme - III Semester
Course Code: 20CA3T2   Title: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
(w.e.f admitted batch 2020-21)

Time: 3 Hours   **Max. Marks: 70**
Answer ALL questions   **(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,L1) 10 Marks
                                (or)
    b) Explain *Informed Search Strategies* in brief. (CO1,L2) 10 Marks

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

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

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

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

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Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A
Title of the Paper: Design & Analysis of Algorithms
Semester: III

Course Code	20CA3T3	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	**Introduction:** What is Algorithm, Algorithm Specification Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity Time Complexity, Asymptotic Notation, Performance Measurement, Randomized Algorithms: Basics of Probability Theory, Randomized Algorithms Identifying the Repeated Element, Primality Testing: Advantages and Disadvantages. **Elementary Data Structures:** Stacks and Queues, Trees: Terminology, Binary Trees, Dictionaries: Binary Search Trees, Priority Queues, Heaps , Heapsort , Sets and Disjoint Set Union: Introduction-Union and Find Operations, Graphs:	10

	Introduction, Definitions, Graph Representations.	
II	**Divide-and-Conquer:** General Method, Defective Chess Board, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort, Selection Problem, Strassen's Matrix Multiplication, Convex Hull: Some Geometric Primitives, The Quick Hull Algorithm, Graham's Scan, An O(nlogn) Divide and Conquer Algorithm. **The Greedy Method:** The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.	14
III	**Dynamic Programming:** The General Method, Multi Stage Graphs, All Pairs Shortest Paths, Single Source Shortest Paths, Optimal Binary Search Trees, String Editing -0/1 Knapsack, Reliability Design, The Traveling Sales Person Problem, Flow Shop Scheduling. **Basic Traversal and Search Techniques:** Techniques for Binary Trees, Techniques for Graphs: Breadth First Search and Traversal-Depth First Search, Connected Components and Spanning Trees, Bi-Connected Components and DFS.	17
IV	**Backtracking:** The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem. **Branch and Bound :** The Method: Least Cost Search, The 15 Puzzle Control Abstractions for LC Search, Bounding, FIFO Branch and Bound , LC Branch and Bound, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution, Traveling Sales person.	11
V	**NP-Hard and NP-Complete Problems:** Basic Concepts: Non Deterministic Algorithms, The Classes NP Hard and NP Complex, Cook's Theorem, NP Hard Graph Problems, Clique Decision Problem, Node Cover Decision Problem Chromatic Number Decision Problem, Directed Hamiltonian Cycle, Traveling Sales Person Decision Problem, AND/OR Graph Decision Problem, NP-Hard Scheduling Problems, Scheduling Identical Processors, Flow Shop Scheduling, Job Scheduling, NP-Hard Code Generation Problems, Code Generation With Common Sub Expressions, Implementing Parallel Assignment Instructions, Some Simplified NP-Hard Problems.	8

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

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

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

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

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M.C.A. Programme - III Semester

Course Code: 20CA3T3   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? A*pply 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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Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A
Title of the Paper: Cloud Computing
Semester: III

Course Code	20CA3T4	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	**Era of Cloud Computing:** Getting to Know the Cloud, Peer-to-Peer, Client-Server and Grid Computing, Cloud Computing versus Client-Server Architecture, Cloud computing versus Peer-To Peer Architecture, Cloud computing versus Grid Computing, How we got to the Cloud, Server Virtualization versus Cloud Computing, Components of Cloud Computing, Cloud Types, Cloud Computing Service Delivery Models. **Introducing Virtualization**: Introducing Virtualization and its Benefits, Implementation Levels of Virtualization, Virtualization at the OS Level, Virtualization Structure, Virtualization Mechanisms, Open Source Virtualization Technology, Binary Translation with Full Virtualization, Virtualization of CPU, Memory and I/O Devices, Hardware support for Virtualization in Intex x86 Processor.	12

II	**Cloud Computing Services:** Infrastructure as a Service, Platform as a Service, Language and Pass, Software as a Service, Database as a Service. **Open Source Cloud Implementations and Administration:** Open-Source Eucalyptus Cloud Architecture, Open-Source Open Stack Cloud Architecture.	12
III	**Application Architecture for Cloud:** Cloud Application Requirements, Recommendations for Cloud Application Architecture, Fundamental Requirements for Cloud Application Architecture, Relevance and use of Client-Server architecture for Cloud Application, Service Oriented Architecture for Cloud Applications. **Cloud Programming:** Programming Support for Google Apps Engine, Big Table as Google's NOSQL System, Chubby as Google Distributed Lock Service, Programming Support for Amazon EC2, Elastic Block Store (ESB).	12
IV	**Risks, Consequences and Costs for Cloud Computing:** Introducing Risks in Cloud Computing, Risk Assessment and Management, Risk of Vendor Lock-In, Risk of Loss Control, Risk of Not Meeting Regulatory Compliances, Risk of Resource Scarcity, Risk in Multi Tenant Environment, Risk of Failure, Risk of Failure of Supply Chain, Risk of Malware and Internet Attacks, Risk of Inadequate SLA , Risk of Management of Cloud Resources, Risk of Network Outages, Risks in the Physical Infrastructure, Legal Risk due to Legislation, Risks with Software and Application Licensing, Security and Compliance Requirements in a Public Cloud, Direct and Indirect Cloud Costs, Calculating Total Cost of Ownership for Cloud Computing, Cost Allocations in a Cloud. **AAA Administration for Clouds:** The AAA Model, Single Sign-On for Clouds, Industry Implementations for AAA, Authentication Management in the Cloud, Authorization Management in the Cloud.	12
V	**Application Development for Cloud:** Developing On-Premise Versus Cloud Applications, Modifying Traditional Applications for Deployment in Cloud, Stages during the development process of Cloud Application, Managing a Cloud Application, Using Agile Software Development for Cloud Application, Cloud Applications: What Not to do, Static Code Analysis for Cloud Applications, Developing Synchronous and Asynchronous Cloud Applications. **Mobile Cloud Computing:** Definition of Mobile Cloud Computing, Architecture of Mobile Cloud Computing, Benefits of Mobile Cloud Computing, Mobile Cloud Computing Challenges.	12

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

Course Code: 20CA3T4   **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) What is *DBaaS*? (CO2,L1)
   d) What is a *Cinder?* (CO2,L1)
   e) What is *EC2*? (CO3,L1)
   f) What is *GFS?* (CO3,L1)
   g) List *risks* of using *Inadequate SLA*. (CO4,L1)
   h) Define *SSO.* (CO4,L1)
   i) Why *Static Code Analysis* is used 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)
   b) Compare and contrast *Cloud Computing Architecture* with *Peer to Peer Architecture*. (CO1,L2)
                     (or)
   c) Explain *Virtualization* and its benefits and levels. (CO1,L2)
   d) Explain the *Virtualization Structures* and *Virtualization Mechanisms*. (CO1,L2)
UNIT II
3) a) Explain *Cloud Computing Services*. (CO2,L2)
                  (or)
   b) Explain *Open Source Cloud Architectures*. (CO2,L2)

UNIT III
4) a) Summarize the requirements of *Cloud Application*. (CO3,L2)
   b) Explain *Service Oriented Architecture* for Cloud Applications. (CO3,L2)
                  (or)
   c) Explain the *Big Table* as Google's NoSQL System. (CO3,L2)
   d) Explain *Elastic Block Store*. (CO3,L2)
UNIT IV
5) a) Explain the *Risks in Cloud Computing*. (CO4,L2)
                  (or)
a)   Describe the *AAA Model for Clouds*. (CO4,L2)

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

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Programme: M.C.A
Title of the Paper: Cryptography & Network Security
Semester: III

Course Code	20CA3T5	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	**Computer & Network Security Concepts:** Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques **Advanced Encryption Standard:** AES Structure, An AES Example, AES Implementation. Random Bit Generation and Stream Ciphers: Principles of Pseudo Random Number Generation, Pseudo Random Number Generators.	12
II	**Introduction to Number Theory:** Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. **Public Key Cryptography and RSA:** Principles of Public Key Crypto Systems, The RSA Algorithm. **Other Public-Key Crypto Systems:** Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. **Message Authentication Codes:** Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC.	12
III	**Digital Signatures:** Digital Signatures, NIST Digital Signature Algorithm. **Key Management and Distribution:** Symmetric Key Distribution Using Asymmetric Encryption,Distribution of Public Keys. **User Authentication:** Kerberos, Remote User-Authentication Using Asymmetric Encryption.	12
IV	**Transport Level Security:** Transport Layer Security. **Electronic Mail Security:** S/MIME, Pretty Good Privacy. **IP Security:** IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining SecurityAssociations.	12
V	**Intruders:** Intruders, Intrusion Detection, Password Management. **Firewalls:** The Need for Firewalls, Firewall Characteristics and Access Policy, Types of Firewalls.	12

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

Reference Text Book

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

Course has focus on : Employability

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

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

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A Programme - III Semester
Course Code: 20CA3T5   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*? (CO1,L1)
    d) What is Message Encryption? (CO1,L1)
    e) What is the difference between *Symmetric Key Distribution* & *Asymmetric Key Distribution*?
       (CO1,L1)
    f) What is *Mutual Authentication?* (CO1,L1)
    g) State any two Protocols of *Transport Layer Security*. (CO1,L1)
    h) What is *Pretty Good Privacy?* (CO1,L1)
    i) What is *Firewall?* (CO1,L1)
    j) State any two *Intrusion Detection Techniques*. (CO1,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(CO4,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
    problems? (CO5,L6) 10 Marks
                                      (or)
    b) Discuss *Various Types of Firewalls*. (CO5,L6) 10 Marks

Parvathaneni Brahmayya Siddhartha College of Arts & Science: Vijayawada.
(An autonomous college in the jurisdiction of Krishna University)

M.Sc (Mathematics)Programme - III Semester

OPTIMIZATION TECHNIQUES (OPEN ELECTIVE- II)

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

OFFERED BY DEPARTMENT OF MATHEMATICS
FOR THE BATCH OF STUDENTS ADMITTED IN 2020-21

Course Code	21OE06	Course Delivery Method	Blended Mode
Credits	**4**	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of offering : 2021-22	Year of Revision: ----	Percentage of Revision :--

Course Objectives : The objective of this course is to develop problem solving skills and to acquire knowledge on basic concepts of linear programming problems, Transportation problems, Assignment problems, PERT/CPM Techniques and Optimization.

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

CO1: Apply different optimization techniques to maximize profit and minimize loss of

various problems of society and Industry   (PO1)

CO2: Convert standard business problems into linear programming problems and solve

them using simplex method   (PO4)

CO3: Formulate and solve Transportation problems.   (PO5)

CO4: Formulate and solve Assignment problems   (PO5)

CO5: Apply the concepts of PERT and CPM for decision making and optimally

managing projects.   (PO5)

CO-PO MATRIX								
21OE06	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	CO1	H						
	CO2				H			
	CO3					H		
	CO4					H		
	CO5					H		

Unit	Learning Units	Lecture Hours
I	**Optimization:** Introduction to Optimization, Classification of Optimization Problems, Linear vs. Nonlinear Programming Problems, Unconstrained Minimization Problems, Gradient-Based Methods (Steepest Decent (Cauchy) Method), Newton's Method, Introduction to Derivative Free Optimization, Derivative Based vs Derivative Free Optimization. (Sections 14.1 to 14.7 of Chapter 14 of [1])	12
II	**Linear programming and its Applications:** Nature, Meaning and Scope of Operations Research, Role of Computers in OR, Introduction, Formulation of LP problems, slack and surplus variables, Graphical solution of LP Problems, Applications of Linear Programming. **Linear Programming Problem**: Introduction, Some more definitions and Notations, Computational Procedure of Simplex Method, Simple way for Simplex calculations. (Sections 1.2, 1.11, 1.15 of chapter 1, 3.1 to 3.5 and 3.11 of chapter 3 and 5.1to 5.4 of chapter 5 of [2])	12
III	**Transportation Models:** Introduction, Mathematical Formulation, Matrix form of the Transportation Problem, Feasible Solution, Basic feasible solution and Optimum solution, Tabular Representation, The Initial Basic Feasible Solution (I.B.F.S.) to Transportation Problem, Transportation Algorithm for minimization Problem, MODI(Modified Distribution Method), Unbalanced Transportation Problem, Time minimizing Transportation problem. (Sections 12.1, 12.2, 12.4 to12.5 and 12.8, 12.10, 12.12 and 12.13 of Chapter 12 of [2])	12
IV	**Assignment Models:** Introduction, Mathematical formulation of Assignment problem, Hungarian method for Assignment problem, Unbalanced Assignment problem, variations of the	

		Assignment problem, The Travelling Salesman Problem, A Typical Assignment Problem. (Sections 11.1, 11.2, 11.4 to 11.7 and 11.9 of chapter 11 of [2])	12
V	**Project Management by PERT-CPM:** Introduction, Applications of PERT/CPM Techniques, Basic steps in PERT/CPM Techniques, Network Diagram Representation, Rules for drawing Network diagram, Time Estimates and Critical Path in Network Analysis, Project Evaluation and Review Technique(PERT). (Sections 25.1 to 25.6, 25.8 and 25.10 of chapter 25 of [2])		12

PRESCRIBED BOOKS:

[1] Anuradha S, Vincy Joseph,, Machine Learning, Wiley, First Edition, 2019.
[2] S.D.Sharma, Operations Research, Meerut,Improved and Enlarged Edition, KedarNath RamNath& Co, 2002.

REFERENCE BOOKS:

[1]Nita H.Shah, Ravi M. Gor, HardikSoni, Operations Research,PHI, 2010.
[2] A.Taha, Operations Research: An Introduction, 9th edition, Prentice Hall, 2010.

Course has Focuson : Skill development and Employability

Websites of Interest: 1. www. Nptel.ac.in

2. www.epgp.inflibnet.ac.in

3. www.ocw.mit.edu

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ParvathaneniBrahmayya Siddhartha College of Arts & Science: Vijayawada.
(An autonomous college in the jurisdiction of Krishna University)

MODEL QUESTION PAPER

OPTIMIZATION TECHNIQUES (OPEN ELECTIVE- II)

Time:3 hours   Max.: 70 M

SECTION A

Answer all questions.   10 X 2= 20

    1) Write unconstrained maximization problem.   (CO1,L1)
    2) Explain Newton's method.   (CO1,L1)
    3) Write standard form of LPP.   (CO2,L1)
    4) Define feasible solution and basic feasible solution of an LPP.   (CO2,L1)
    5)Write necessary and sufficient condition for the existence of a feasible
solution to atransportation problem .   (CO3,L2)
    6) Write Vogel's approximation method.   (CO3.L2)
    7) Write mathematical formulation of Assignment problem.   (CO4.L2)
    8)What is unbalanced Assignment problem?   (CO4,L2)
    9) Define PERT and CPM.   (CO5,L1)
    10) Write applications of PERT/CPM techniques.   (CO5,L2)

SECTION B

Answer the following questions. All questions carry equal marks.   5X10= 50

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

(CO1,L4)

(Or)

(b) What is Steepest descent method? Explain with an example.   (CO1,L4)

12. (a) Find a geometrical interpretation and solution as well for the following LPP.   (CO2,L4)

$$\text{Max } z = 3x_1 + 5x_2$$

$x_1 + 2x_2 \leq 2000$

$x_1 + x_2 \leq 1500$

$x_1 + x_2 \leq 600$

$x_i \geq 0, i=1,2.$

(Or)

(Turn over)

(b) Solve the following L.P.P using simplex method.   (CO2,L4)

$$\text{Max } z = 3x_1 + 2x_2 + 5x_3$$

$x_1 + 2x_2 + x_3 \leq 430,$

$3x_1 + 2x_3 \leq 460,$

$x_1 + 4x_2 \leq 420,$

$x_1, x_2, x_3 \geq 0$

13.(a) Find the optimal solution by finding the IBFS using the Vogel's method for the following transportation problem.   (CO3,L4)

	A	B	C	Available
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Required	4	2	2	

(Or)

(b) Solve the following Transportation Problem using stepping stone algorithm.(CO3,L4)

	I	II	III	IV	supply
A	40	44	48	35	160
B	37	45	50	52	150
C	35	40	45	50	190
Demand	80	90	110	220	

14.(a) Explain the Hungarian method.   (CO4,L3)

(OR)

(b) Solve the following assignment problem. (CO4,L3)

	A	B	C	D	E
1	11	10	18	5	9
2	14	13	12	19	6
3	5	3	4	2	4
4	15	18	17	9	12
5	10	11	19	6	14

(Turn over)

15.(a) Compare PERT and CPM.
  (b) Explain the following: i) Total float ii) Free float   iii) Critical path.   (CO5,L5)
(Or)

(c) A projecthas the following time schedule:

Activity	Time in Weeks	Activity	Time in Weeks
(1-2)	4	(5-7)	8
(1-3)	1	(6-8)	1
(2-4)	1	(7-8)	2
(3-4)	1	(8-9)	1
(3-5)	6	(8-10)	8
(4-9)	5	(9-10)	7
(5-6)	4		

 Draw PERT network and compute:

(i) T_E and T_L for each event (ii) Float for each activity.   (CO5,L5)

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P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010.
NAAC reaccredited at 'A+' level
Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A.

Title of the Paper: Project work

Semester: IV

Course Code	20CA4P1	CIA Marks	100
Credits	8	Semester End Exam Marks	100
No. of Practical Hours / Week	16	Total Marks	200

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

CO-PO MATRIX								
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
20CA4P1	CO1	H	M		L		M	
	CO2	H		H		H		M
	CO3	H	M					
	CO4		H	H				
	CO6			M				H

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

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

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

PROJECT WORK

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

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

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

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

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

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

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Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A

Title of the Paper: Data Wrangling and Data Visualization

Semester: IV

Course Code	20CA4T1	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	2 (Theory) & 4 (Lab)	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: 2021	Year of Offering: 2021		Percentage of Revision: Nil

Course Objective: To understand and gain knowledge on *Data Wrangling, Files & Exception and Handling*, *NumPy and Pandas*, *Data Extraction from different Sources* and *Data Visualization Concepts*.

Course Outcomes:
Upon successful completion of this course, the student will be able to understand:
CO1 : Understand *Data wrangling in real life*, *Files & Exception Handling.*
CO2 : How data is stored and processed in *Numpy* and *Pandas*.
CO3 : Extracting data from different sources.
CO4: Visualization of Data.
CO5: Plotting Data.

UNIT I

Data Wrangling: Importance of Data Wrangling, Python for Data Wrangling, Python Data Structures (Lists, Sets, Strings, Tuples, and Dictionaries), Basic File Operations in Python.

Files & Exception and Handling: User defined Modules and Packages in Python, Files (File manipulations, File and Directory Related Methods), Python Exception Handling.

UNIT II

Numpy: NumPy Arrays, NumPy Arrays and Features, Creating a NumPy Array (From a List), Adding Two NumPy Arrays, Mathematical Operations on NumPy Arrays, Advanced Mathematical Operations, Conditional Sub Setting, Array Operations Stacking Arrays.

Advanced NumPy Operations: Filtering, Sorting, Combining, Reshaping.

Pandas: Pandas Data Frames, Creating a Pandas Series, Pandas Series and Data Handling, Creating Pandas Data Frames, Viewing a Data Frame Partially, Indexing and Slicing Columns, Indexing and Slicing Rows,Creating and Deleting a New Column or Row.

Using NumPy and Pandas: Calculate Basic Descriptive Statistics, Calculating Descriptive Statistics from a DataFrame, Generating Statistics from a CSV File, Advantages of Pandas over NumPy, Disadvantages of Pandas.

Basic Operations of Pandas: Indexing, Slicing, Iterating, Series.

Advanced pandas Operations: Filtering, Sorting, Reshaping**.**

UNIT III

Subsetting, Filtering and Grouping: Analyzing Duplicate Values**,** Label Encoding and Binning, Detecting Outliers and Handling Missing Values, Missing Values in Pandas, Filling in the Missing Values Using the *fillna* method, The *dropna* Method.

Concatenating, Merging, and Joining: Concatenation in Datasets, Merging by a Common Key, The join Method.

Useful Methods of Pandas: Randomized Sampling, The *value_counts* Method, *pivot_table* Functionality, the *sort_values* Method, Flexibility of *user_defined* Functions with the apply Method.

Getting Comfortable with Different Kinds of Data Sources: Reading Data from Different Sources, Reading Data Using Pandas, Reading Data from a CSV File, Reading CSV Data from a Zip File, Reading from an Excel File Using *sheet_name* and Handling a Distinct *sheet_name*, Reading HTML Tables directly from a URL, Reading from a JSON File, Reading a PDF File.

Introduction to Beautiful Soup 4 and Web Page Parsing: Reading an HTML File and Extracting its Contents using Beautiful Soup, Data Frames and Beautiful Soup, Exporting a Data Frame as an Excel File, Stacking URLs from a Document Using BS4, reading Tabular Data from a Web Page and Creating Data Frames.

UNIT IV

The Importance of Data Visualization and Data Exploration: Introduction, Introduction to Data Visualization, The importance of Data Visualization, Data Wrangling, Tools and Libraries for Visualization.
All You Need to Know about Plots:
Comparison Plots: Line Chart, Bar Chart, Radar Chart.
Relation Plots: Scatter Plot, Bubble Plot and Heat Map.
Composition Plots: Pie Chart, Stacked Bar Chart, Stacked Area Chart.
Venn Diagram.
Distribution Plots: Histogram, Density Plot, Box Plot, Violin Plot.
Geoplots: Dot Plot, Choropleth Map.
Connection Map.

UNIT V

Plots in Matplotlib: Pyplot Basics, Basic Text and Legend Functions (Labels, Titles, Text, Annotations, Legends).

Basic Plots: Bar Chart, Pie Chart, Stacked Bar Chart, Stacked Area Chart, A Stacked Area Chart, Histogram, Box Plot, Scatter Plot, Bubble Plot.
Layouts: Subplots, Tight Layout, Radar Charts.

Prescribed Text Book			
	Author	Title	Publisher
1	Brian Lipp, Shubhadeep Roychowdhury, Dr. Tirthajyoti Sarkar	The Data Wrangling Workshop - Create Your Own Actionable Insights using Data from Multiple Raw Sources, 2nd Edition.	Packt Publishing Ltd.
2	Mario Doebler, Tim Grossmann	The Data Visualization Workshop - A self-Paced, Practical Approach to Transforming Your Complex Data into Compelling, Captivating Graphics.	Packt Publishing Ltd

Reference Text Books			
	Author	Title	Publisher
1	Jacqueline Kazil, Katharine Jarmul	Data Wrangling with Python	O'Reilly Media, 2016
2	Claus Wilke	Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures	O'Reilly Media, 2019

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A Programme - IV Semester
Course Code: 20CA4T1   Title: Data Wrangling and Data Visualization
(w.e.f admitted batch 2020-21)

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

SECTION-A
Answer ALL questions   **(10×2 = 20 Marks)**
  1)   a. Summarize Basic *File Operations* in python with examples. (CO1,L2)
          b. Explain the process of *creating tuples* and *dictionaries* with examples in python. (CO1,L2)
          c. What are the *advantages of Pandas over Numpy*. (CO2,L1)
          d. Explain steps involved in generating statistics from csv file. (CO2,L2)
          e. Compare *filna* and *dropna* methods. (CO3,L2)
          f. What is the importance of *Pivot Tabling Functionality*. (CO3,L1)
          g. Explain types of *geoplots* with examples. (CO4,L2)
          h. Comapre and contrast *Comparision* vs *Composition* charts. (CO4,L2)
          i. Explain the importance of *Histogram* over *Barchart.* (CO5,L2)
          j. Summarize *Radar Charts* with example. (CO5,L2)

SECTION-B
Answer all questions. All question carry equal marks.   **5 × 10 M =50 M**

  2) a. Illustrate *File Manipulation* in *numpy* with examples. (CO1,L2) 5 M
      b. Explain the role of *Exception Handling.* (CO1,L2) 5 M
                                                      (or)
      c. Explain the importance of *Data wrangling* with real life examples. (CO1,L2) 10 M

  3) a. Explain *Array Operations* in *numpy* with examples. (CO2,L5) 10 M
                                                      (or)

b. Explain *Filtering*, *Sorting* and *Reshaping* operations in Pandas with examples. (CO2,L5) 10 M

4) a. Analyze the process of *Concatenation*, *Merging* and *Joining* with examples. (CO3,L4) 10 M
(or)
   b. Analyze how *Web Page Parsing* can be done using *Beautiful Soup4*. (CO3,L4) 5 M
   c. List the reading of data from any *Four Types Data Sources* with examples. (CO3,L4) 5M

5) a. With example explain any *Four Composition Plots*. (CO4,L3) 10 M
(or)
   b. With example explain role of *Distribution Plots.* (CO4,L3) 10 M

6) a. Explain *Text* and *Legend* functions in Data Visualization. (CO5,L5) 10 M
Or
   b. Explain *Layouts* with suitable examples. (CO5,L5) 10 M

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Programme: M.C.A

Title of the Paper: Applied Data Analysis

Semester: IV

Course Code	20CA4T2	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 : 2022	Year of Offering: 2022	Year of Revision: Nil	Percentage of Revision: Nil

Course Objective: To understand and familiar with *R-Programming*, *Data Structures*, *Descriptive Statistical Analysis*, *Basic Graphs*, *Analysis of ANOVA*, *Multivariate Analysis, Files & Databases*.

Course Outcomes:
After the successful completion of this module, students will be able to:
CO1 : *Install*, *code* and *use* R Programming Language in R Studio IDE to perform basic tasks on Control Flow Statements, Data Structures and can invoke Operations on Data Structures.
CO2 : Understand the *Basic Terminologies*, *Concepts and Techniques* employed in Descriptive Statistical Analysis.
CO3 : Be familiar with *Basic Graphics* and *Analysis of* ANOVA.
CO4 : Gain knowledge on *Basic Multivariate Analysis*.
CO5 : Apply how to import *Different Files* and *Connecting Databases to R*.

UNIT I
Introduction to R: Why use R?, R Environment, Working with R Packages, Understanding Datasets, Data Types, Data Structures (Operations on Data Structures), Missing Values, Sorting Data, Merging Datasets, Subsetting Datasets, Control Flow Statements, Aggregation and Restructurings.

UNIT II
Descriptive Statistics: Introduction to Descriptive Statistics (Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes (Skewness and Kurtosis)), Introduction to Sampling(Sampling Types), Hypothesis Testing with R(One Sample Test, One Sample Sign Test, Two Samples Test), Parametric Test(Correlations, Z-Test, T-Test), Non Parametric Tests (Wilcoxon Signed- Rank Test, Chi Square Test).

UNIT III

Basic Graphs: Bar Plots, Pie Charts, Histograms, Line, Dot Plots, Kernel Density Plots and Dot Plots.
The Advanced Graphics: The ggplot2 Package.
Analysis of Variance: Fitting ANOVA Models, One-way ANOVA, One-way ANCOVA, Two-way factorial ANOVA, Repeated measures ANOVA, Multivariate Analysis of Variance (MANOVA)

UNIT IV

Basic Multivariate Analysis: Regression (Simple Linear Regression, Multiple Linear Regression, Logistic Regression), Time Series Analysis (Creating Time Series, Components of Time Series Analysis, Seasonal Decomposition, Exponential Models), Forecasting (Simple Moving Averages, Weighted Moving Averages, Single Exponential Smoothing.)

UNIT V

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

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

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

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.C.A Programme - IV Semester
Course Code: 20CA4T2   Title: Applied Data Analysis
(w.e.f admitted batch 2020-21)

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

1. (a) What are the different *Data Types* used in R. (CO1,L1)
    (b) Define *Subsetting*. (CO1,L1)
    (c)How to remove missing values in R? (CO2,L2)
    (d) What is meant by *Random Sampling*? (CO2,L2)
    (e) What is *Correlation*? (CO3,L1)
    (f) What is meant by T-Test? (CO3.L1)
    (g) What is the purpose of ANOVA? (CO4,L1)
    (h) Define *Logistic Regression*. (CO4,L1)
    (i) Define *Time Series Analysis*. (CO5,L1)
    (j) What is the syntax used to read *XML Files*. (CO5,L1)

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks.   **(5×10 = 50 Marks)**
UNIT-I
2. (a) Outline the different *Data Structures* used in R. (CO1,L2)
                        (or)
    (b) Explain *Control Flow Statements* in R. (CO1,L2)

UNIT-II
3. (a) Explain the different statistical measures used in *Descriptive Statistics*. (CO2,L5)
                        (or)
    (b) Explain *Non Parametric Test*and *Wilcoxon Signed-Rank Test* in R with example.
(CO2,L5)

UNIT-III
4. (a) List *Various Types of Charts* in R. (CO3,L4)
                        (or)
    (b) Analyze *One-way ANOVA* and *Two-way factorial ANOVA*. (CO3,L4)

UNIT-IV

5. (a) Discuss *Simple* and *Multiple Regression* in R with Example. (CO4,L6)

(or)

(b) Eloborate different components used in *Time Series Analysis in R* with example. (CO4,L6)

UNIT-V

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

(or)

(b) How to do you import *csv file* and *binary file* in R with example? (CO5,L5)

P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010.
NAAC reaccredited at 'A+' level
Autonomous -ISO 9001 – 2015 Certified

Programme: M.C.A

Title of the Paper: Deep Learning

Semester: IV

Course Code	20CA4T3	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021	Year of Offering: 2021	Year of Revision: Nil	Percentage of Revision: Nil

Course Objective: This Course focuses towards the introduction of *Deep Learning* and focuses on the practical implementations of *Artificial Neural Networks*, *Tensor Flow and Keras*, *CNN* and *RNN*.

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

CO1 :   Remember *inspiration of Neural Networks from Brain, Artificial Neuron and its Architecture, Input and Output Layers in Neural Networks, Activation Functions, Loss Functions, Optimizers, Data Representation for Neural Networks, The gears of Neural Networks.*

CO2 : Understand *Activation Functions*, *Loss Functions*, *Optimizers*, *Training a Neural Net*, Feed Forward Mechanism, *Back Propagation in Neural Networks*, *Gradient Descent Algorithm.*

CO3 : Develop *Hand Digit Recognition in Keras*, *Regression With Neural Networks*, *Classification With Neural Networks*, *Building Image Classifier Using Sequential API*, *Building Regression MLP using Sequential API*, *Building Complex Models Using Sequential API*, *Building Dynamic Models using Sequential API.*

CO4 : Analyze *Data Preprocessing in CNN Alexnet*, *Googlenet*, *LeNet-5*, *VGGNet*, *ResNet*, *Xception*, *SENet*, *Image Classification with CNN using Keras*, *Transfer Leaning in CNN*, *Using Pre Trained Models from Keras.*

CO5 : Understand a *Recurrent Layer in Keras*, *Understanding the LSTM* and *GRU Layers*, *A LSTM example in Keras*, *A Temperature Forecasting Problem*, *Preparing the Data*, *First Recurrent Baseline.*

UNIT I

Introduction to Deep Learning: Deep Learning Vs Machine Learning, Inspiration of Neural Networks
from Brain, The Perceptron:The Simple Idea Behind Neural Networks, Artificial Neuron and its Architecture, Input and Output Layers in Neural Networks, Activation Functions, Loss Functions, Optimizers, Data Representation for Neural Networks, The Gears of Neural Networks.

UNIT II

Artificial Neural Networks: Architecture, Input and Output Layers in Neural Networks, Activation Functions, Loss Functions, Optimizers, Training a Neural Net. Feed Forward Mechanism, Back Propagation in Neural Networks, Gradient Descent Algorithm, Updating Weights and Biases, Vanishing/Exploding Gradients Problems, Reusing Pre Trained Layers, Faster Optimizers.

UNIT III

Introduction to Tensorflow and Keras: Building ANN with Keras, Problems of Vanishing Gradient and Exploding Gradient, Modifications to Neural Networks, Regularization, Normalization, Dropouts. Hand Digit Recognition in Keras, Regression with Neural Networks, Classification with Neural Networks, Building Image Classifier Using Sequential API, Building Regression MLP using Sequential API, Building Complex Models using Sequential API, Building Dynamic Models using Sequential API, Virtulizing using Tensor Board.

UNIT IV

Convolution Neural Networks (CNN): Meaning of Convolution. Architecture of CNN. Filters, Padding, Data Preprocessing in CNN, Alexnet, Googlenet, LeNet-5,VGGNet, ResNet, Xception, SENet, Image Classification with CNN using Keras, Transfer Leaning in CNN, Using Pre Trained Models from Keras, Pre Trained Models for Transfer Learning, Classification and Localization.

UNIT V

Recurrent Neural Networks (RNN): A Recurrent layer in Keras, Understanding the LSTM and GRU Layers, A LSTM example in Keras, A Temperature Forecasting Problem, Preparing The Data, First Recurrent Baseline, Using Recurrent Dropout to Fight Over Fitting, Stacking Recurrent layers, Using Bidirectional RNN's

Prescribed Text Book			
	Author	Title	Publisher
1	François Chollet	Deep Learning with Python	Second Edition Paperback-Manning,2017

2	AurelienGeron	Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems	O'Reilly, 2nd Edition, 2019

Reference Text Book		
Author	Title	Publisher
1 Peter Bruce	Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python	O'Reilly

Course Delivery method: Face-to-face / Blended

Course has focus on: Employability

Websites of Interest:
1. https://playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=reg-plane&learningRate=0.03&regularizationRate=0&noise=0&networkShape=4,2&seed=0.97530&showTestData=false&discretize=false&percTrainData=50&x=true&y=true&xTimesY=false&xSquared=false&ySquared=false&cosX=false&sinX=false&cosY=false&sinY=false&collectStats=false&problem=classification&initZero=false&hideText=false
2. https://in.mathworks.com/campaigns/offers/deep-learning-with-matlab.html?ef_id=EAIaIQobChMI1_KAuZjv9QIVxZlmAh00DQGcEAAYASAAEgIk3vD_BwE:G:s&s_kwcid=AL!8664!3!281794527284!p!!g!!deep%20learning&s_eid=psn_57384022752&q=deep%20learning&gclid=EAIaIQobChMI1_KAuZjv9QIVxZlmAh00DQGcEAAYASAAEgIk3vD_BwE
3. https://youtu.be/yuVTAZL5BRQ?list=PLOzRYVm0a65cTV_t0BYj-nV8VX_Me6Es3&t=94
4. https://youtu.be/yuVTAZL5BRQ?list=PLOzRYVm0a65cTV_t0BYj-nV8VX_Me6Es3&t=146

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

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M.C.A Programme - IV Semester
Course Code: 20CA4T3   Title: Deep Learning
(w.e.f admitted batch 2020-21)

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

1. a) What are the differences between *Deep Leaning* and *Machine Learning*? (CO1,L1)
    b) Write short notes idea behind *Neural Networks*. (CO1,L1)
    c) What are *input* and *output layers*? (CO2,L2)
    d) What is *Loss Function*? (CO2,L1)
    e) What is *Vanishing Gradient*? (CO3,L1)
    f) What are modifications to *Neural Networks?* (CO3,L1)
    g) State and explain *Convolution*. (CO4,L1)
    h) What is *padding*? (CO4,L1)
    i) What is Recurrent *Layer*? (CO5,L1)
    j) State Preparing Data. (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 *Artificial Neuron and its Architecture*. (CO1,L2) 10 M
                                                (or)
    b) Explain *Data Representation for Neural Networks*. (CO1,L2) 10 M

UNIT- II
3. a) Explain *Gradient Descent Algorithm*. (CO2,L2) 10 M
                                                (or)
   b) Illustrate *Faster Optimizers* (CO2,L2) 10 M

UNIT-III
4. a) Explain *Building Image Classifier using Sequential API*. (CO3,L5) 10 M
                                                (or)
   b) Explain *Back propogation in Neural Networks*   (CO3,L5)   10 M

UNIT-IV
5. a) Explain *Imagge Classififcation with CNN using KERAS* (CO4,L5) 10 M
                                                (or)
   b) Justify the need of *Classification and Localization*. (CO4,L5) 10 M

UNIT-V
6. a) Discuss *Temperature Forecasting Problem*. (CO5,L6) 10 M
                                                (or)
    b) Discuss using Recurrent Dropout to Fight Over Fitting. (CO5,L6) 10 M

COURSE	COURSE CODE	L	T	P	C	Year
PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA	21CA4M1	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								
21CA4M1	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	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