BHARATHIDASAN UNIVERSITY TIRUCHIRAPPALLI-620 024.

B.Sc. ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

Sem.	Part	Course	Title	Ins. Hrs	Credit	Exam Hours	Marks		Total
							Int.	Ext.	
I	I	Language Course – I Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course - I		6	3	3	25	75	100
	III	Core Course – I (CC)	Programming in C and Data Structures	5	4	3	25	75	100
		Core Practical – I (CP)	Programming in C Lab	4	4	3	40	60	100
		First Allied Course – I (AC)		4	4	3	25	75	100
		First Allied Course – II (AC)		3	-	-	-	-	-
	IV	Value Education		2	2	3	25	75	100
	TOTAL			**30**	**20**	**-**	**-**	**-**	**600**
II	I	Language Course - II Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course- II		6	3	3	25	75	100
	III	Core Course – II (CC)	Programming in Python	5	4	3	25	75	100
		Core Practical – II (CP)	Programming in Python Lab	4	4	3	40	60	100
		First Allied Course – II (AC)		3	2	3	25	75	100
		First Allied Course – III (AC)		4	4	3	25	75	100
		Add on Course – I ##	Professional English – I	6*	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Language Proficiency for Employability -Effective English	-	2	3	25	75	100
	TOTAL			**30**	**28**	**-**	**-**	**-**	**900**

III	I	Language Course – III Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course -III		6	3	3	25	75	100
	III	Core Course – III (CC)	RDBMS and NoSQL	5	4	3	25	75	100
		Core Practical – III (CP)	RDBMS and NoSQL Lab	4	4	3	40	60	100
		Second Allied Course – I (AC)		4	4	3	25	75	100
		Second Allied Practical (AP)		3	-	-	-	-	-
		Add on Course – II ##	Professional English - II	6*	4	3	25	75	100
	IV	Non-Major Elective I @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either **a)** Basic Tamil if Tamil language was not studied in school level **or** b) Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.		2	2	3	25	75	100
	TOTAL			**30**	**24**	**-**	**-**	**-**	**700**
IV	I	Language Course –IV Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course – IV		6	3	3	25	75	100
	III	Core Course -IV (CC)	Artificial Intelligence	5	4	3	25	75	100
		Core Practical - IV (CP)	Artificial Intelligence Lab	4	4	3	40	60	100
		Second Allied Practical (AP)		3	2	3	40	60	100
		Second Allied Course – II (AC)		4	4	3	25	75	100
	IV	Non-Major Elective II @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either **a)** Basic Tamil if Tamil language was not studied in school level **or** b) Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.		2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Digital Skills for Employability	-	2	3	25	75	100
	TOTAL			**30**	**24**	**-**	**-**	**-**	**800**

V	III	Core Course -V (CC)	Embedded Systems and IoT	5	5	3	25	75	100
		Core Course - VI(CC)	Open Source Software	5	5	3	25	75	100
		Core Course - VII(CC)	Robotics	5	5	3	25	75	100
		Core Practical -V (CP)	Robotics Lab	4	4	3	40	60	100
		Major Based Elective – I (Any one)	1. Virtual Reality and Augmented Reality 2. Fuzzy Logic and Neural Networks	5	5	3	25	75	100
	IV	Skill Based Elective I	Mobile Application Development	4	2	3	25	75	100
		Soft Skills Development		2	2	3	25	75	100
	TOTAL			**30**	**28**	**-**	**-**	**-**	**700**
VI	III	Core Course - VIII (CC)	Human Computer Interaction	6	6	3	25	75	100
		Core Course -IX (CC)	Machine Learning	6	6	3	25	75	100
		Core Practical - VI(CP)	Machine Learning Techniques Lab	4	4	3	40	60	100
		Major Based Elective - II (Any one)	1. Natural Language Processing 2. Deep Learning	5	5	3	25	75	100
		Project		4	3	-	20	80	100
	IV	Skill Based Elective – II	Cloud Computing	4	2	3	25	75	100
	V	Gender Studies		1	1	3	25	75	100
		Extension Activities **		-	1	-	-	-	-
	VI	Naan Mudhalvan Scheme (NMS) @@		-	-	-	-	-	-
		TOTAL		**30**	**28**	**-**	**-**	**-**	**700**
GRAND TOTAL				**180**	**152**	**-**	**-**	**-**	**4400**

List of Allied Courses

First Allied Course	Second Allied Course
Mathematics	Applied Physics

For those who studied Tamil upto 10th +2 (Regular Stream).

+ Syllabus for other Languages should be on par with Tamil at degree level.

Those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part- I should study special Tamil in Part – IV.

The Professional English – Four Streams Course is offered in the 2nd and 3rd Semester (only for 2022-2023 Batch) in all UG Courses. It will be taught apart from the Existing hours of teaching / additional hours of teaching (1 hour /day) as a 4 credit paper as an add on course on par with Major Paper and completion of the paper is must to continue his / her studies further. (As per G.O. No. 76, Higher Education (K2) Department dated: 18.07.2020).

* The Extra 6 hrs / cycle as per the G.O. 76/2020 will be utilized for the Add on Professional English Course.

@ NCC Course is one of the Choices in Non-Major Elective Course. Only the NCC cadets are eligible to choose this course. However, NCC Course is not a Compulsory Course for the NCC Cadets.

** Extension Activities shall be outside instruction hours. @@

Naan Mudhalvan Scheme.

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	No. of Credits	Marks
1.	I	Language Courses	4	12	400
2.	II	English Courses	4	12	400
3.	III	Core Courses	8	40	800
4.		Core Practical	7	29	700
5.		Allied Courses I & II	4	16	400
6.		Allied Practical	2	4	200
7.		Major Based Elective Courses	2	8	200
8.		Add on Courses	2	8	200
9.		Project	1	3	100
10.		Non-Major Elective Courses (Practical)	2	4	200
11.		Skill Based Elective Courses	2	4	200

12.	IV	Soft Skills Development	1	2	100
13.		Value Education	1	2	100
14.		Environmental Studies	1	2	100
15.	V	Gender Studies	1	1	100
16.		Extension Activities	1	1	--
17.	VI	Naan Mudhalvan Scheme	2	4	200
	Total		**45**	**2**	**4400**

PROGRAM OBJECTIVES:

- Upon completion of this undergraduate programme on B.Sc. Artificial Intelligence and Machine Learning, the students will be able to
- Exhibit good domain knowledge and completes the tasks with expected quality standards.
- To be capable of modelling, designing, implementing and verifying a computing system to meet specified requirements for the benefit of society.
- Design and develop research based solutions for complex problems.
- To possess critical thinking, communication skills, teamwork, leadership skills and ethical behaviour necessary to function productively and professionally.
- Able to apply analytical and critical thinking to identify, formulate and analyse complex problems
- Establish the ability to listen, read, proficiently communicate and articulate complex ideas.

PROGRAM OUTCOMES:

After successful completion of B.Sc. AI &ML program the students are expected to

- Apply the concepts and practical knowledge in analysis, design and development of computing systems and applications to multi-disciplinary problems.
- Provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Artificial Intelligence and Machine Learning with ethical values
- Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and machine learning in terms of underlying statistical and computational principles.
- Learn the basic concepts of AI & ML and apply in various research areas like image processing, speech recognition and Medical diagnostics etc.,
- Find solutions to complex AI problems using various AI tools

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First Year **CORE COURSE I** **Semester I**

PROGRAMMING IN C AND DATA STRUCTURES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To know about the basics of C Programming, Control and Looping Structures and programming with it.
- To understand Arrays, Pointers and String Processing in C language
- To know about the basic concepts in Data Structures.

UNIT - I:

Basic of C: History of C and its importance – Structure of a C program – Data Types – Constants and Variables – Operators and Expressions – Order of Precedence, Evaluating of Arithmetic Expressions – Type Conversion- Decision Statements: if, if-else, and nested if statements.

UNIT - II:

Loops Structures: For Loop, While, Do-while loop – Arrays: - One Dimensional Array, Two-dimensional Arrays, Character Arrays and Strings – Functions: Function with arrays- Function with decision and looping statements - Recursion.

UNIT - III:

Pointers: Introduction – Pointer Expressions – Chain of Pointers – Pointers and Arrays – Array of Pointers – Pointers as function arguments – Functions returning Pointers – Pointers to Functions – Function pointer – Structures - declaration, initialization, Array of Structures – Pointer to structures, Structures and functions – Typed of Enumerated data types, Unions.

UNIT - IV:

Strings Processing, Standard string library functions – Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to an existing file – File IO – Reading and writing structures.

UNIT - V:

Stack: LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linked List: concepts, operations – Doubly Linked List: concepts, operations – Trees: General trees, Binary trees.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned.

REFERENCES:

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, New Delhi, Seventh Edition, 2016.
2. E. Horowitz, S. Sahni and Susan Anderson Freed, "Fundamental Data Structures in C", 2ed, Orient Black Swan Publisher, 2009.
3. Byron S. Gottfried, "Programming with C", Schaum's Outline Series, Tata- McGraw Hill Edition, New Delhi, 1991.
4. E. Karthikeyan, "A Textbook on C Fundamentals, Data Structures and Problem Solving", Prentice-Hall of India Private Limited, New Delhi, 2008.
5. Yashavant Kanetkar, "Let us C", BPB Publications, Tenth Edition, New Delhi, 2010.
6. Szuhay, Jeff, and Szuhay, Jeff, "Learn C Programming: A Beginner's Guide to Learning C Programming the Easy and Disciplined Way", Packt Publishing, 2020.
7. Jena, Sisir Kumar, and Jena, Sisir Kumar, "C Programming:Learn to Code", CRC Press, 2021.
8. https://www.tutorialspoint.com/cprogramming/index.htm
9. https://www.w3schools.in/data-structures/intro

COURSE OUTCOMES:

Upon successful completion of this course the students would be able to:

CO	COURSEC OUTOME	K LEVEL
CO1	To Summarize the basic knowledge to develop C programs	K2
CO2	To Manipulate Looping, arrays and functions	K4
CO3	To Apply and write programs for solving real world problems	K3, K2
CO4	To Create open, read, manipulate, write and close files.	K5
CO5	To Understand the basic concepts in data structures	K2

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	2	3	2	2	3	2
CO2	1	2	2	1	1	1	2	3	3	2
CO3	2	1	3	1	2	3	1	2	3	1
CO4	1	2	2	-	3	1	2	2	3	2
CO5	2	2	3	-	3	2	1	1	2	3

First Year **CORE PRACTICAL I** **Semester I**

PROGRAMMING IN C LAB

Code: **(Practical)** **Credit: 4**

COURSE OBJECTIVES:

- To learn the programming knowledge using C language.
- To create derived and user defined data types.
- To demonstrate the functioning of pointers in C.

1. Write a Program
   a. To convert temperature from degree Centigrade to Fahrenheit.
   b. To find whether the given number is Even or Odd.
   c. To find the greatest of three numbers.
2. Write a Program to use the switch statement to display Monday to Sunday.
3. Write a Program to display first Ten Natural Numbers and their sum.
4. Write a Program to find Multiplication of Two Matrices.
5. Write a Program
   a. To find the maximum number in Array using pointer.
   b. To reverse a number using pointer.
   c. To add two numbers using pointer.
6. Write a Program to solve Quadratic Equation using functions.
7. Write a Program to find factorial of a number using Recursion.
8. Write a Program to show Call by Value and Call by Reference.
9. Write a Program to create a file containing Student Details.
10. Write a program to implement a stack using singly linked list, Implement Queue using Linked List.

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

CO	COURSEC OUTOME	K LEVEL
CO1	To Relate the use of language constructs to solves impel programs	K4
CO2	To Develop programs for various concepts in C language	K4
CO3	To Understand and trace the execution of the list of programs	K2
CO4	To Understand the usage of file handling in C programming Solved at a problems related to data structures	K2
CO5	To Understand the basic concepts in C	K2

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	2	3	2	2	3	2
CO2	1	2	2	1	1	3	3	3	3	1
CO3	2	1	3	1	2	3	1	1	2	1
CO4	1	2	2	-	3	3	2	2	3	3
CO5	2	2	3	-	3	3	2	2	3	3

First Year **CORE COURSE II** **Semester II**

PROGRAMMING IN PYTHON

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To develop programs using functions and pass arguments in Python.
- To write programs using loops and decision statements in Python.
- To design and program Python applications.

UNIT - I:

Introduction to Python: Features of Python - How to Run Python - Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) - Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers – Strings – List – Tuple – Set – Dictionary – Data type conversion.

UNIT - II:

Flow Control: Decision Making – Loops – Nested Loops – Types of Loops. Functions: Function Definition – Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

Unit - III:

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling- Directories in Python.

UNIT - IV:

Object-Oriented Programming: Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes- Destructorsin Python – Encapsulation - Data Hiding – Inheritance - Method Overriding- Polymorphism.

UNIT - V:

Exception Handling: Built-in Exceptions-Handling Exceptions- Exception with Arguments - Raising Exception - User-definedException - Assertions in Python. Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags-Regular Expression Patterns- Character Classes-Special Character Classes - Repetition Cases - findall() method - compile()

method.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

An Introduction to Interactive Programming in Python - Study on Julia – an high level language approach.

REFERENCES:

1. Jeeva Jose and P. Sojan Lal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Book Publishing Co, 2016.
2. Mark Summerfield. — Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
3. Martin C. Brown, —PYTHON: The Complete Reference‖, McGraw-Hill, 2001
4. Wesley J. Chun, "Core Python Programming", Prentice Hall Publication, 2006.
5. Timothy A Budd, "Exploring Python", Tata McGraw Hill, New Delhi, 2011
6. Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016.
7. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O Reilly Publishers, 2016
8. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

CO	COURSE OUTOME	K LEVEL
O1	To recall and understand the features of python programminglanguage	K2
CO2	To illustrate various programming mechanism used in python	K2
CO3	To apply various language construct to write simple programs inpython	K5
CO4	Write java To examine the application of object oriented concept in python programs using Applets	K2
CO5	To distinguish the various constructs used in python.	K5

Mapping with Programme Outcomes and Programme Specific Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	3	3	3	3	2.2	1.86
CO2	2	2	1	3	3	3	3	3	1.8	0.68
CO3	2	2	2	2	2	3	3	3	0.4	1.4
CO4	2	2	2	3	3	3	3	3	2.6	3
CO5	2	2	3	2	2	3	3	3	3	3

First Year **CORE PRACTICAL II** **Semester II**

PROGRAMMING IN PYTHON LAB

Code: **(Practical)** **Credit: 4**

COURSE OBJECTIVES:

- To develop the Numbers, Math functions and Strings.
- To create different Decision Making statements and Functions.
- To design GUI Applications in Python.

1. Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects.
2. Write a python program to find the largest three integers using if-else and conditional operator.
3. Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4. Write a python program to find the product of two matrices [A]mxp and [B]pxr
5. Write recursive functions for GCD of two integers.
6. Write recursive functions for the factorial of positive integer.
7. Write recursive functions for Fibonacci Sequence up to given number n.
8. Write recursive functions to display prime number from 2 to n
9. Write a python program that writes a series of random numbers to a file from 1 to n and display
10. Write a python program to sort a given sequence: String, List and Tuple.
11. Write a python program to make a simple calculator.
12. Write a python program for Linear Search and Binary Search

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

CO	COURSEC OUTOME	K LEVEL
CO1	To recall and relate the features of python programming language	K4
CO2	To compare various programming mechanism used in python	K4
CO3	To construct simple programs in python using various languagefeatures	K2
CO4	To distinguish the various constructs used in python	K2
CO5	To the application of object oriented concept in python	K2

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	2	3	2	2	3	2
CO2	1	2	2	1	1	3	3	3	3	1
CO3	2	1	3	1	2	3	1	1	2	1
CO4	1	2	2	-	3	3	2	2	3	3
CO5	2	2	3	-	3	3	2	2	3	3

Second Year	CORE COURSE III RDBMS AND NOSQL	Semester III
Code:	(Theory)	Credit: 4

COURSE OBJECTIVES:

- To know the basic concepts about database, its concepts, applications, data models, schemas and instances.
- To gain knowledge about database system architecture, the relational data model and about SQL.
- To Know about NoSQL and data models in NoSQL

UNIT - I:

Introduction to Databases : Databases and Database Users - Introduction - Example - Characteristics of the Database Approach - Actors on the Scene -Workers behind the Scene - Advantages of Using the DBMS Approach - A Brief History of Database Applications

UNIT - II:

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 - Classification of Database Management Systems - The Relational Data Model and SQL : 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 - III:

Basic SQL : SQL Data Definition and Data Types - Specifying Constraints in SQL - Basic Retrieval Queries in SQL - INSERT, DELETE, and UPDATE Statements in SQL - Additional Features of SQL - More SQL: Complex Queries, Triggers, Views, and Schema Modification - More Complex SQL Retrieval Queries - Specifying Constraints as Assertions and Actions as Triggers - Views (Virtual Tables) in SQL - Schema Change Statements in SQL

UNIT - IV:

NoSQL : The Value of Relational Databases - Impedance Mismatch - Application and Integration Databases - Attack of the Clusters - The Emergence of NoSQL - Aggregate Data Models : Aggregates - Key-Value and Document Data Models - Column-Family Stores - Summarizing Aggregate-Oriented Databases.

UNIT - V:

Details on Data Models: Relationships - Graph Databases - Schemaless Databases - Materialized Views - Modeling for Data Access - Distribution Models:

Single Server - Sharding Master-Slave Replication - Peer-to-Peer Replication - Combining Sharding and Replication.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Fundamentals of Database System By Elmasari & Navathe- Pearson Education, 7th Edition, 2017
2. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. & Fowler, Wiley Publications, 1st Edition ,2019.
3. Bipin Desai, An Introduction to Database System Galgotia Publications, 1981
4. S.K. Singh Database System: concept, Design & Application, Pearson Education, 2011
5. leon & leon, Database management system, Vikas publishing House, 2009
6. Toby J. Teorey, Sam S. Lightstone, Tom Nadeau, Database Modeling and Design: Logical Design, Elsevier India Publications, 2005
7. Gillenson, Fundamentals of Database Management System, Wiley, 2008

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

- To know about databases and about database users.
- To understand the concept of Database system structure and the concept of Relational model.
- To know about SQL.
- To know about the Emergence of NoSQL.
- To understand about data models in NoSQL.

Upon successful completion of this course the students would be able:

CO	COURSEC OUTOME	K LEVEL
CO1	To Relate the use of language constructs to solves impel programs	K4
CO2	To Develop programs for various concepts in C language	K4
CO3	To Understand and trace the execution of the list of programs	K2
CO4	To Understand the usage of file handling in C programming Solved at a problems related to data structures	K2
CO5	To Understand the basic concepts in C	K2

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	2	3	1	2	1	1
CO2	1	2	2	1	1	3	2	3	1	1
CO3	2	1	3	1	2	3	1	2	1	1.4
CO4	1	2	2	-	3	3	2	3	3	3
CO5	2	2	3	-	3	3	2	1	3	1

Second Year	**CORE PRACTICAL III RDBMS AND NOSQL LAB**	**Semester III**
Code:	**(Practical)**	**Credit: 4**

COURSE OBJECTIVES:

- To practise the relational database functions using various operations
- To write queries in SQL to retrieve any type of information from a data base.
- To be able to understand unstructured table creation and processing usingNoSQL.

Demonstrate the following SQL commands and can take any back end RDBMSsystem for implementation purpose.

1. Write a SQL query for creating Table, and SQL queries for inserting, deleting,updating the records in Table.
2. Write SQL Queries for AND/OR/NOT operation, Union-Intersection andMinus
3. Write SQL queries for various Join Operations.
4. Write SQL query for Sorting and Grouping the records.
5. Write Nested queries, Sub queries using SQL.
6. Write a SQL program using Built-in functions.
7. Create a view and access the view using query.
8. Creation of unstructured table contents using Nosql commands

COURSE OUTCOMES:

Upon successful completion of this course, the students would be able:

Upon successful completion of this course the students would be able:

CO	COURSEC OUTOME	K LEVEL
CO1	To work on database queries.	K4
CO2	To relate the entity relationship and join de pendencieswith softwareprograms	K4
CO3	Write queries on aggregate functions, sub queires.	K2
CO4	Create structured and unstructured database using SQL and NoSQL	K2
CO5	Able to implement various functions of NoSQL.	K2

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	2	3	2	2	3	2
CO2	1	2	2	1	1	3	2	2	3	1
CO3	2	1	3	1	2	3	2	2	2	1
CO4	1	2	2	-	3	3	3	2	3	3
CO5	2	2	3	-	3	3	3	3	3	3

ALLIEDCOURSE I
ALGEBRA AND CALCULUS

Code: 22SCACMM2A **(Theory)** **Credit:4**

COURSEOBJECTIVES:

- To train the students to solve the problems in theory of equations
- To provide knowledge about the matrix, differentiation and various methods for evaluation of integrals.

UNIT–I:

Theory of Equations: Relation between roots & coefficients –Transformations of

Equations–Diminishing, Increasing &multiplying the roots by a constant-Forming equations with the given roots–Rolle's Theorem, Descarte's rule of Signs(statement only)– simple problems.

UNIT–II:
Matrices: Singular matrices–Inverse of a non-singular matrix using adjoint method-Rank of a Matrix – Consistency - Characteristic equation, Eigen values, Eigen vectors – Cayley Hamilton's Theorem (proof not needed) –Simple applications only

UNIT–III:
Differentiation: Maxima & Minima– Concavity, Convexity – Points of inflexion - Partial differentiation – Euler's Theorem - Total differential coefficients (proof not needed)–Simple problems only.

UNIT–IV:
Integration: Evaluation of integrals of types:

$$\frac{px+q}{} \qquad \frac{px+q}{} \qquad \frac{dx}{} \qquad \frac{dx}{}$$

1) $\int \frac{dx}{ax^2+bx+c}$ 2) $\int \frac{dx}{\sqrt{ax^2+bx+c}}$ 3) $\int \frac{}{a+bcosx}$ 4) $\int \frac{}{a+bsinx}$

Evaluation using Integration by parts–Properties of definite integrals– Fourier Series in the range $(0, 2\pi)$ – Odd & Even Functions – Fourier Half range Sine &Cosine Series.

UNIT–V:

Differential Equations: Variables Separable–Linear equations–Second order of types$(aD^2 + bD + c)y = F(x)$where a,b,c are constants and $F(x)$is one of the following types (i)e^{Kx}(ii)sin(kx) or cos(kx) (iii)x^n, n being an integer(iv)$e^{Kx}f(x)$

UNIT–VI CURRENT CONTOURS (For Continuous Internal Assessment Only): Derivatives of Implicit and parametric Functions

REFERENCES:

1. T.K.ManickavasagamPillai&others,Algebra,VolumeI,S.VPublications,1985RevisedEdition(UnitsI,II)
2. S.Narayanan, T.K. Manicavachagam Pillai, Calculus,Vol.II,S.ViswanathanPvtLimited,2003.(UnitsIII,IVandV)
3. M.L.Khanna,DifferentialCalculus,JaiprakashnathandCo.,Meerut-2004.

COURSE OUTCOMES:

After completion of the course the students will be able to realize the following outcomes:

CO	COURSE OUTOME	K LEVEL
CO1	Train the students to solve the problems in theory of equations.	K1
CO2	Apply Cayley Hamilton theorem for finding the inverse of square matrices.	K3
CO3	Get exposed the basic concepts of differentiation and integration.	K2
CO4	Acquire the knowledge about differential equations.	K5
CO5	Learn the concepts of second – order differential equations with constant coefficients and train the students to solve it	K4,K5

Mapping with Programme and Programme specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	1	2	2	1	2	3	2
CO2	1	2	2	1	1	3	2	3	1	2
CO3	2	1	3	1	2	1	3	2	3	2

CO4	**1**	**2**	**2**	**2**	**3**	3	2	1	2	3
CO5	**2**	**2**	**3**	**1**	**3**	3	1	2	3	3

NUMERICALANALYSISAND PROBABILITY

Code: 22SCACMM2B **(Theory)** **Credit:2**

COURSEOBJECTIVES:

- To learn knowledge about an algebraic and transcendental equations.
- To make the students gain wide knowledge in probability which plays a main role in solving real life problems.

UNIT–I:

Algebraic&Transcendentalequations:BisectionMethod,NewtonRaphsonMethod, Iteration method - Finite differences – Forward, Backward differences – Newton‘sforward&backwarddifferenceinterpolationformulae– Lagrange‘sinterpolatingpolynomial.

UNIT–II:

Numericaldifferentiation-NumericalIntegrationusingTrapezoidalruleandSimpson‘s first & second rules (proof not needed) - Solutions to Linear Systems –Gaussian Elimination Method – Jacobi & Gauss Siedal iterative methods –Theory and problems.

UNIT–III:

Numerical solution of ODE: Solution by Taylor Series Method, Euler‘s Method, Runge - Kutta 2nd order method- Adam‘s Predictor Corrector Method and Milne‘s Predictor Corrector Methods.

UNIT–IV:

Arithmetic Mean – Geometric Mean – Harmonic Mean - Median, Mode, StandardDeviation-QuartileDeviation–Percentiles-Expectation– Varianceandcovariance.

UNIT–V:

CorrelationandRegression–PropertiesofSimpleCorrelationandregressioncoefficients– SimpleNumericalProblemsonly.

REFERENCES:

1. S.S. Sastry, Numerical Analysis(Unit1,2,3)

2. Gupta.S.C&Kapoor,V.K,FundamentalsofMathematicalStatistics,SultanChand&sons,NewDelhi-1994.(Units4&5)
3. M.K.Jain,S.R.K.IyengarandR.K.Jain,NumericalMethodsforScientificandEngineeringComputation,NewAgeInternationalPrivateLimited,1999.
4. C.E.Froberg,IntroductiontoNumericalAnalysis,IIEdn.,AddisonWesley,1979.

COURSEOUTCOMES (CO)

After completion of the course the students will be able to realize the following outcomes:

CO	COURSEOUTOMES	K LEVEL
01	Solve algebraic and transcendental equations.	
02	Apply the various methods of Numerical differentiation and Integration.	
03	Get exposed the basic concepts of mean, median and mode.	
04	Understand the students to solve the problems of Correlation and Regression.	
05	Appreciate the importance of probability of random variables and understand the correlation and regression coefficients.	

Mapping with Programme Outcomes and Programme Specific Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	1	2	3	3	3	2
CO2	3	2	3	1	2	2	2	2	3	3
CO3	1	3	1	2	2	3	2	2	3	2
CO4	2	2	1	3	3	3	3	3	2	3
CO5	2	1	2	3	2	3	3	3	2	2

ALLIED COURSEIII
OPERATIONSRESEARCH

Code: 22SCACMM2C **(Theory)** **Credit:4**

COURSEOBJECTIVES:

- To learn the basic concepts about Linear Programming Problem, Transportation Problem Assignment Problem, Sequencing Problem and Network.
- To make students solve real life problems in Business and Management.

UNIT–I:

OperationsResearch:Introduction-BasicsofOR–OR&decisionmaking–Roleof Computers in OR - Linear programming formulations & graphical solution of two variables–Canonical &standard forms of LPP

UNIT–II:

Simplex Method: Simplex Method for <, =, > constraints – Charne‘s method of penalties–Two phase Simplex method.

UNIT–III:

Transportation problem: Transportation algorithm–Degeneracy algorithm–Degeneracy in Transportation Problem, Unbalanced transportation problem- Assignment algorithm–Unbalanced Assignment problem

UNIT–IV:

Sequencing problem: Processing of n jobs through two machines – Processing of njobsthrough3machines–processing of two jobs through machines.

UNIT–V:

Networks: Network – Fulkerson‘s rule - measure of activity – PERT computation –CPM computation-Resource scheduling.

REFERENCES:

1. Manmohan&Gupta,OperationsResearch,SultanChandPublishers,NewDelhi
2. Prem Kumar Gupta and D.S.Hira ,Operations Research: An Introduction,
3. S.Chandand Co.,Ltd. NewDelhi,
4. Hamdy A. Taha, Operations Research (7th Edn.), McMillan PublishingCompany,NewDelhi,1982.

COURSEOUTCOMES (CO)

After completion of the course the students will be able to realize the following outcomes:

CO	COURSEC OUTOME
CO1	Acquire the basic concepts of LPP.
CO2	Apply various methods for finding a solution of an LPP.
CO3	Categorize the various simplex methods.
CO4	Evaluate transportation and degeneracy algorithms.
CO5	Use the basic concepts of TP ,AP and Network Problems to develop the problem solving skills.

Mapping with Programme Outcomes and Programme Specific Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**3**	**2**	**2**	**3**	**1**	**2**	**3**	**1**	**1**	**2**
CO2	**2**	**1**	**2**	**3**	**2**	**1**	**2**	**1**	**3**	**3**
CO3	**2**	**3**	**2**	**1**	**2**	**3**	**2**	**2**	**3**	**2**
CO4	**1**	**2**	**2**	**3**	**2**	**1**	**3**	**1**	**2**	**3**
CO5	**2**	**2**	**1**	**2**	**2**	**2**	**3**	**3**	**1**	**1**