



PSGR Krishnammal College for Women



College of Excellence, **nirf** 2021-6th Rank

Autonomous and Affiliated to Bharathiar University

Reaccredited with A++ grade by NAAC, An ISO 9001: 2015 Certified Institution

Peelamedu, Coimbatore-641004

B.Sc. Computer Science (Artificial Intelligence)

CHOICE BASED CREDIT SYSTEM (CBCS)

AND

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

Syllabus

2021 – 2024 Batch



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Programme Learning Outcomes (PLO)

After completion of the Programme, the students will be able to

PLO1: Exhibit technical and technological knowledge in core areas of computer science and Artificial Intelligence.

PL02: Apply technical, problem solving skills and critical thinking to provide solutions for real world complex problems.

PLO3: Acquire professional proficiency to accomplish employability and entrepreneurship

PLO4: Advance skills to gain global competency and innovate in developing and deploying AI applications

PLO5: Acquire holistic development with strong emphasis on values and ethics

PLO6: Uphold social responsibilities in alignment with their roles

Programme Specific Outcomes (PSO)

The students at the time of graduation will

PSO1: Apply technical skills attained through laboratory exercises, projects, internships and value added programmes to solve multi-disciplinary problems

PSO2: Analyze a problem, identify and define the requirements appropriate to obtain solution

PSO3: Design AI experiments, carry out analysis and interpretation of data, to provide valid conclusions for decision making

PSO4: Adapt to emerging technologies to design and implement solutions for societal needs

PSO5: Create systems by applying modern tools for the complex activities

PSO6: Apply ethical principles and responsibilities in all the activities they involve

PSO7: Function effectively as an individual, and as a member or leader in diverse teams

PSO8: Recognize the need and have the ability to engage in independent and life-long learning in the broadest context of technological changes



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B.Sc. Computer Science (Artificial Intelligence)

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES BASED CURRICULAM FRAMEWORK (LOCF)

SYLLABUS - 2021 - 2024 BATCH

Semester	Part	Subject Code	Title of paper	Classification	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2101/ HIN2101 /FRE2101	Language Paper I	Langua ge	6	86	4	3	50	50	100	3
I	II	ENG2101	English Paper I	English	6	86	4	3	50	50	100	3
I	III	AI21C01	Core 1 : Database Management Systems	CC	4	56	4	3	50	50	100	4
I	III	AI21CP1	Programming Lab 1 : RDBMS Lab	CC	3	45	-	3	50	50	50*	3
I	III	AI21CP2	Programming Lab 2: R Programming Lab	CC	3	45	-	3	50	50	50*	2

Semester	Part	Subject Code	Title of paper	Classification	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	III	TH21A25	Allied A1:Linear Algebra	GE	6	86	4	3	50	50	100	5
I	IV	NME19B1/ NME19A1/ NME21ES	Basic Tamil / Advance Tamil / Introduction to Entrepreneurship	AEC	2	28	2	2	50	50	100	2
II	I	TAM2102/ HIN2102/ FRE2102	Language paper II	Language	6	86	4	3	50	50	100	3
II	II	ENG2102	English Paper II	English	5	71	4	3	50	50	100	3
II	III	AI21C02	Core 2: Problem Solving and Java Programming	CC	4	56	4	3	50	50	100	4
II	III	AI21CP3	Programming Lab 3: Java Programming Lab	CC	3	45	-	3	50	50	50*	3
II	III	AI21CP4	Programming Lab 4: SPSS and Advanced Excel Lab	CC	3	45	-	3	50	50	50*	2
II	III	TH21A26	Allied A2: Statistics for Computer Science -I	GE	6	86	4	3	50	50	100	5
II	IV		Open Course (Self-Study– Online)	AEC	-	-	-	-	-	-	-	Grade
II	IV	NME19B2/ NME19A2	Basic Tamil / Advanced Tamil **	AEC	-	-	-	-	-	-	-	Grade

Semester	Part	Subject Code	Title of paper	Classification	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
II	V	21PEPS1	Professional English for physical sciences	AEC	3	40	5	2	50	50	100	2
II	VI	NM12GAW	General Awareness	AEC	Self-Study(Online Test)				100	-	-	Grade
III	III	AI21C03	Core 3: Operating Systems	CC	4	56	4	3	50	50	100	3
III	III	AI21C04	Core 4: Data Structures	CC	4	56	4	3	50	50	100	3
III	III	AI21C05	Core 5: Data Science And Python	CC	4	56	4	3	50	50	100	3
III	III	AI21CP5	Programming Lab 5 : Operating Systems Lab	CC	3	45	-	3	50	50	50*	3
III	III	AI21CP6	Programming Lab 6: Python Lab	CC	4	60	-	3	50	50	50*	3
III	III	TH21A27	Allied A3 : Discrete Mathematics	GE	6	86	4	3	50	50	100	5
III	III	AI21SBP1/ AI21SBCE	Skill Based Subject : NoSql Databases/Cour esra	SEC	3	45	-	2	40	60	100	3
III	IV	NM21EVS	Foundation Course II: Environmental Studies	AEC	-	-	-	-	100	-	-	Grade

Semester	Part	Subject Code	Title of paper	Classification	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
III	IV	NM21UHR	Foundation Course III: Universal Human Values and Human Rights	AEC	2	26	4	-	100	-	100	2
III & IV	VI		Job Oriented Course	SEC	-	-	-	3	-	-	-	Grade

* 100 Marks Converted into 50 Marks

** Outside Regular Class Hours

CC – Core Courses

CA – Continuous Assessment

ESE – End Semester Examination

GE – Generic Electives

AEC – Ability Enhancement Courses

SEC- Skill Enhancement Course

Semester I

Course Number	Course Name	Category	L	T	P	Credit
AI21C01	DATABASE MANAGEMENT SYSTEMS	III	56	4	-	4

Preamble

This course covers the basic concepts of database systems, relational database, queries, object modeling and database design. This course also provides Structured Query Language (SQL), optimization and transaction management. This course also deals with distributed databases.

Prerequisite

Database concepts

Course learning Outcomes

On the successful completion of the course, students will be able to

CLO NO.	CLO Statement	Knowledge level
CLO1	Recall the fundamental elements of database management system	K1
CLO 2	Understand the concepts of relational data model, relational database design, SQL queries and PLSQL	K2
CLO 3	Apply the SQL queries and PLSQL in simple applications.	K3
CLO 4	Analyse the design strategies of database systems in various domains	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	S	M	S	L	L
CLO2	S	M	S	S	L	L
CLO3	M	S	S	M	S	M
CLO4	S	M	M	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

(11Hrs)

Overview of Databases: Managing data – File system Vs. DBMS – Advantages of DBMS – Describing and storing data – Queries in DBMS – Transaction management – Structure of DBMS.

Database Design: Database design and ER diagrams – entities, attributes – relationship and relationship sets- Additional features of ER Model

UNIT II (12Hrs)

Relational Model: Introduction to relational model – Integrity constraints over relations- Querying relational data-Introduction to views – Altering tables and views. **SQL Queries:** Overview – Form of basic SQL query – union, intersect and except – Nested queries- Aggregate operators – triggers, PL SQL, functions and procedures

UNIT III (11Hrs)

Transactions: ACID Properties – Transactions and schedules – Concurrent execution of transactions – **Concurrency Control:** Introduction to lock management – Dealing with deadlocks – Locking techniques

UNIT IV (11Hrs)

Schema Refinement and Normal Forms: Introduction to schema refinement – functional dependencies –Normal forms- Properties of decomposition – Normalization – Schema refinement

UNIT V (11 Hrs)

Distributed Databases: Distributed databases: Introduction – Distributed DBMS architectures – Storing data – Distributed catalog management – Distributed query processing – Updating distributed data.

Text Book

1. Raghu Ramakrishnan and Johannes Gehrke (2003). Database Management System, 3/e, McGraw Hill, Singapore

Reference Books

1. Abraham Silberschatz and S Sudarshan, Database System Concepts, McGraw Hill Education, Sixth edition, 2013.
2. Elmasri Ramez and Navathe Shamkant, Fundamentals of Database Systems , Seventh Edition , 2017
3. Allen G. Taylor, SQL All - In - One For Dummies, Third edition, 2019

Pedagogy

Lectures, Case Studies, Demonstrations

Course Designers

1. Dr. S. Meera
2. Ms. V. Mageshwari

Course Number	Course Name	Category	L	T	P	Credit
AI21CP1	RDBMS LAB	III	-	-	45	3

Preamble

This course provides hands on experience in SQL, PL/SQL programming based concepts. It also covers DDL, DML, and DCL commands of RDBMS.

Prerequisite

Database concepts

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall elements of database queries	K1
CLO2	Understand the concepts of PL/SQL including stored procedures, stored functions, cursors, packages	K2
CLO3	Apply DBMS concepts in developing simple applications using PL/SQL	K3
CLO4	Analyze the usage of database systems in real time applications.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	S	L	L
CLO2	S	M	S	M	M	L
CLO3	M	M	M	S	M	M
CLO4	M	M	S	S	M	S

S- Strong; M-Medium; L-Low.

List of Exercises

1. Exercises to implement the SQL queries and constraints
2. Exercises to implement complex and nested queries
3. Exercises to implement queries with aggregate functions
4. Exercises to implement queries involving date functions, string function and math functions
5. Exercises to implement views, triggers, cursors
6. Exercises to implement the concept of Functions and procedures using PLSQL
7. Exercises to develop simple applications

Pedagogy

Demonstrations

Course Designers

1. Dr. S. Meera
2. Ms. V. Mageshwari

Course Number	Course Name	Category	L	T	P	Credit
AI21CP2	R PROGRAMMING LAB	III	-	-	45	2

Preamble

This course provides hands on training in creating and manipulating various data objects in R. It also covers exercises to implement linear algebra concepts. It also deals with implementation of basic statistical analysis and graphics programming.

Prerequisites

Programming concepts

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the elements in R programming and various constructs.	K1
CLO2	Understand the concepts and features of R Programming	K2
CLO3	Apply R programming in data analytics	K2
CLO4	Analyze various statistical methods of data analytics for simple applications	K3

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	S	L	L
CLO2	S	M	S	M	M	L
CLO3	M	M	M	S	S	M
CLO4	M	M	S	S	S	S

S- Strong; M-Medium; L-Low.

List of Exercises:

1. Exercises to implement mathematical and string functions in R
2. Exercises to implement control structures in R
3. Exercises to implement different data structures such as vectors, lists, data frames, arrays, factors
4. Exercises to implement linear algebra concepts such as matrix operations, eigen values, eigen vectors using R
5. Exercises to implement basic statistical concepts like measures of central tendency, measures of dispersion using R
6. Exercises to implement correlation and regression analysis using R
7. Exercises to create various charts and graphs such as scatter plots, box plots, bar plots, histograms, line plots density plots using R

Pedagogy

Demonstrations

Course Designers

1. Dr. M. S. Vijaya
2. Dr. M.Sasikala

SEMESTER II

Course Number	Course Name	Category	L	T	P	Credit
AI21C02	PROBLEM SOLVING AND JAVA PROGRAMMING	III	56	4	-	4

Preamble

This course covers problem solving strategies and techniques to solve problems using computers. It also includes the concept of loops, arrays, input/output structures, events, exceptions and threads using Java.

Prerequisite

Introduction to programming

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the basic java language syntax and semantics, and elements of java language and execution methods	K1
CLO2	Understand the concepts of object-oriented programming and java programming	K2
CLO3	Apply the principles of inheritance, packages and interfaces in simple java applications	K3
CLO4	Analyze the working features of java language in problem solving	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	M	M	S	S	M
CLO4	M	M	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I:

(12 Hrs)

Introduction to Computer Problem-Solving: Problem-solving aspect, Top-down design, Implementation of algorithms, Program verification, Efficiency of algorithms, Analysis of

algorithms, Types of programming languages. **Fundamentals of Object-Oriented Programming:** Object- Oriented Paradigm, Basic concepts of object-oriented programming, Benefits of object-oriented programming, Application of object-oriented programming.

UNIT II: (11 Hrs)

Java Evolution: History, Features. **Overview of java:** Simple java program, Structure, Java tokens, Java virtual machine, Constants, Variables, Data types. **Operators and expressions - Decision Making and Branching:** if, if...Else, nested if, switch, ?: operator. **Decision Making and Looping:** while, do, for –labelled loops.

UNIT III: (11 Hrs)

Classes, objects and methods – Arrays and strings – Interfaces: Multiple inheritance – Packages: putting classes together.

UNIT IV: (11 Hrs)

Multithreaded programming – Managing errors and exceptions – **Applet Programming:** Introduction, how applet differ from applications, preparing to write applets, building applet code, applet lifecycle.

UNIT V: (11 Hrs)

Graphics programming – **Managing input/output files in java:** Concepts of streams, Stream classes, Byte stream classes, Character stream classes, Using streams, File Class, I/O exceptions, Creation of files, Reading / Writing characters and bytes, Handling primitive data types, Random access files.

Text Book

1. E. Balaguruswamy, Programming with JAVA – A Primer, Mc-Graw Hill Professional, 2015.

Reference Book

1. R.G. Dromey, “How to solve it by Computer”, Pearson Education, 2008.
2. Walter Savitch, Java: An Introduction to Problem Solving and Programming, Eighth Edition, Pearson Education Ltd, 2019.
3. Core Java Volume I—Fundamentals, Cay.S.Horstmann, 11th Edition, 2018, Pearson Education
4. Herbert Schildt – Java: A Beginner’s Guide, 8th Edition, McGraw Hill Education, 2018.

Pedagogy

Lectures, Case Studies, Demonstrations

Course Designers

1. Ms. A. Sheela Rini
2. Dr. J. Athena

Course Number	Course Name	Category	L	T	P	Credit
AI21CP3	JAVA PROGRAMMING LAB	III	-	-	45	3

Preamble

This course provides hands on training to implement Object Oriented programming concept using basic syntaxes of control Structures, strings and functions. It demonstrates inheritance, interfaces and packages. It also explores different exception handling mechanisms and concept of multithreading.

Prerequisite

- Basics of programming
- Object oriented principles

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the logic for the given problem, recognize and understand the syntax and construct JAVA code	K1
CLO2	Understand the java programming constructs and methods	K2
CLO3	Apply OOPs concepts and implement java programs	K3
CLO4	Analyze and implement advanced java programming techniques	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	S	L	L
CLO2	M	M	S	M	M	S
CLO3	S	M	M	S	S	M
CLO4	M	M	S	S	L	S

S- Strong; M-Medium; L-Low

List of Exercises:

- Exercises using classes and objects
- Exercises using control statements
- Exercises using different inheritance
- Exercises using interfaces
- Exercises using packages
- Exercises using string functions
- Exercises using mouse events
- Exercises using thread methods
- Exercises to implement Exception Handling

Pedagogy

Demonstrations

Course Designers

1. Ms. A. Sheela Rini
2. Dr. J. Athena

Course Number	Course Name	Category	L	T	P	Credit
AI21CP4	SPSS AND ADVANCED EXCEL LAB	III	-	-	45	2

Preamble

This course provides hands on training in data analysis methods using statistical analysis software package SPSS. It also covers statistical methods in Excel to perform data analysis and forecasting.

Prerequisite

Basic statistics

Course Learning Outcomes

On successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the excel operations like pivot tables, scenarios, goal seek, lookup and advanced filters	K1
CLO2	Understand the features of SPSS and the advanced features in excel	K2
CLO3	Apply the descriptive and inferential statistical techniques using SPSS and excel	K3
CLO4	Analyze and interpret various descriptive tests in SPSS to supplement decision making in business scenario	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	S	S	M	L	L
CLO2	S	M	S	M	M	L
CLO3	S	S	M	S	M	S
CLO4	M	M	S	S	S	S

S- Strong; M-Medium; L-Low

List of Exercises:

- Exercises using various statistical measures
- Exercises to implement graphs and charts for exploratory data analysis
- Exercises to implement correlation analysis using SPSS
- Exercises to implement regression analysis using SPSS
- Exercises to implement T-test, F-test, Chi-square test using SPSS
- Exercises to implement ANOVA using SPSS
- Exercises to implement Advanced Filters in Excel
- Exercises to implement Data Validation in Excel
- Exercises to implement Scenarios, Goal seek
- Exercises to implement Vlookup, Hlookup in Excel
- Exercises to implement Pivot Tables and Pivot Charts in Excel
- Exercises to implement Timeline using Gantt chart
- Exercises to implement Macros in Excel
- Exercises to implement Dashboards in Excel

Pedagogy

Demonstrations

Course Designers

1. Dr. M.S. Vijaya
2. Dr. M. Sasikala

SEMESTER III

Course Number	Course Name	Category	L	T	P	Credit
AI21C03	OPERATING SYSTEM	III	56	4	-	3

Preamble

This course introduces the basic operating system structure, process management, synchronization and CPU scheduling. It also include, main components of OS and their working. It also covers file system interface and implementation.

Prerequisites

- Computer Architecture
- Programing Principles

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the various elements and principles of Operating systems	K1
CLO2	Understand the concepts, operations and processes involved in operating system.	K2
CLO3	Apply the techniques and algorithms of operating system in simple tasks	K3
CLO4	Analyze the methods and algorithms of various processes of operating system	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

SYLLABUS

Unit I

(11 Hrs.)

Operating Systems Overview – Introduction - Operating Systems Role, Computer System Organization, Computer System Architecture, Computer System Operations, Resource

Management, Security and Protection, Virtualization, Distributed Systems, kernel Data Structures, Computing Environments. Operating Systems Structures - Operating System Services, User and Operating Systems Interface, System calls, Systems Services, **Linkers and Loaders, Design and Implementation, Building and Booting an OS.**

Unit II (12 Hrs.)

Processes – Process Concepts, Process Scheduling, Operations On Processes, Inter-process Communication, IPC in Shared-Memory and Message-passing Systems, Examples of IPC Systems, Threads And Concurrency – Multicore Programing, Multithreads Models, Thread Libraries, Threading Issues **CPU Scheduling – Basic Concepts, Scheduling Criteria, Scheduling Algorithms- Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.**

Unit III (11 Hrs.)

Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **Main Memory – Contiguous Memory Allocation, Paging, Structure of Page Table, Swapping.** Virtual-Memory - Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory Compression.

Unit IV (11 Hrs.)

File System Interface - File Concept, Access Methods, Directory Structure, protection, Memory-Mapped Files. File System Internals –File Systems, Partitions and Mounting, File Sharing, **Virtual File Systems, Remote File Systems.**

Unit V (11 Hrs.)

Virtual Machines: Overview, History, Benefits and features, Blocking Blocks, Types of VMs and Their Implementation, Virtualization and Operating Systems Components, Examples. Case Studies – Linux Systems: Linux History, Design principles, Kernel Modules, Process management, Scheduling, **Memory management, File Systems, Input and Output, Inter-process Communication, network Structure, Security.**

Text Books

Abraham Silberschatz , Greg Gagne, Peter B. Galvin, Operating System concepts , Wiley Publisher, 10th Edition, 2017

Reference Books

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition, Wiley India Private Limited, New Delhi.
2. Andrew S. Tanenbaum (2014), Modern Operating Systems, Pearson Education

Pedagogy

Lectures, Demonstration, Case studies.

Course Designers

1. Dr. M.Sasikala
2. Dr. S. Meera

Course Number	Course Name	Category	L	T	P	Credit
AI21C04	DATA STRUCTURES	III	56	4	-	3

Preamble

This course covers various data structures, including arrays, structures, stacks, queues, linked lists and trees. It also includes sorting and searching techniques.

Prerequisite

- Programming
- Operating System

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO 1	Remember primitive and non-primitive data structures and their operations	K1
CLO 2	Understand the principles and operations of various data structures	K2
CLO 3	Apply the techniques and algorithms of data structures in solving simple tasks	K3
CLO 4	Analyze data structures algorithms suitable for appropriate applications	K4

Mapping with Programming Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

Syllabus

UNIT-I

(12 Hrs.)

Introduction and Overview:- Introduction - Basic Terminology: Elementary Data Organization - Data Structures -**Data structure operations**- Algorithms: Complexity, Time-Space Trade-off. Preliminaries: Algorithmic Notation - Control Structures, Variables, Data Types. Arrays,

Records and Pointers: Introduction - Linear Arrays - **Representation of Linear Arrays in Memory - Traversing Linear Arrays - Inserting and Deleting.**

UNIT-II

(11 Hrs.)

Linked Lists: Introduction - Linked Lists - Representation of Linked Lists in Memory- **Traversing a Linked List – Searching a Linked List-Memory Allocation-Garbage Collection – Insertion into a Linked List-Deletion from a Linked List.**

UNIT-III

(11 Hrs.)

Stack, Queues, Recursion: Introduction – Stacks - **Array Representation of Stacks -Linked Representation of Stacks - Arithmetic Expressions** - Polish Notation - Recursion-Towers of Hanoi - Implementation of Recursive Procedures by Stacks – Queues - **Linked Representation of Queues – Dequeue** - Priority Queues.

UNIT-IV

(11 Hrs.)

Trees: Introduction - Binary Trees - Representing Binary Trees in Memory-**Traversing binary trees-Binary search Trees-Searching-Inserting-Deleting in a Binary Search** Trees-Graphs: Terminology–Sequential Representation of Graphs-Adjacency Matrix, Path Matrix

UNIT-V

(11 Hrs.)

Sorting and Searching:Introduction – Sorting – Bubble Sort-**Insertion Sort - Selection Sort - Merging - Merge Sort** - Radix Sort - Searching and Data Modification –Searching:Linear Search - Binary Search

Text Book

1. Seymour Lipschutz, Data Structures Tata McGraw Hill Company, Revised First Edition, Tenth Reprinted 2017

Reference Books

1. Ellis Horowitz, SartajSahni, Fundamentals of Data Structures,Galgotia Book Source, 2003, Reprinted 2014.
2. K.Sharma, Data Structures using C, Pearson education 2014.
3. RajdewTiwari and Nagesh Sharma, Design and Analysis of Algorithms, Pearson education 2014.

Pedagogy: Lectures, Demonstrations, Discussions
Course Designers

1. Dr. J. Athena
2. Ms. A. SheelaRini

Course Number	Course Name	Category	L	T	P	Credit
AI21C05	DATA SCIENCE AND PYTHON	III	56	4	-	3

Preamble

This course introduces the concepts of programming in Python and Data Science. It also provides various steps involved in the data science process and core python with advanced concepts like regular expressions, exception handling, multithreading and database programming.

Prerequisites

Problem Solving and Programming

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic programming elements and methods related to the data science	K1
CLO2	Understand the concepts of Python Programming such as lists, tuples and dictionary	K2
CLO3	Apply the functions of the python programming to solve the problems.	K3
CLO4	Analyze the library functions for various modules	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

Syllabus

UNIT – I

(10 Hrs.)

Data Science: Introduction – Benefits and Uses of Data Science – Facets of Data – Big Data ecosystem and data science. **Data Science Process: Overview of Data Science Process – Steps in Data Science Process**

UNIT – II

(12 Hrs.)

Python – origins – features. Python basics: statement and syntax Identifiers- variable and assignment – Identifiers- Basic style guidelines- Memory Management- Related Module and Developer Tools – **Python objects: Standard types and other built in type internal types – Standard type operators – Standard type built-in functions.** Numbers – Introduction to Numbers – Integers – Double precision floating point numbers Complex numbers – Operators- Numeric type functions.

UNIT – III

(11 Hrs.)

Sequences-Strings-Strings and Operators- String built-in methods- Lists and Tuples – List type Built in Methods – Tuples Operator and Build in Functions. Mapping type: Dictionaries – Mapping type operators – Mapping type Built-in and Factory Functions - Mapping type built in methods. Dictionary Keys- Set types and operators. **Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter() function**

UNIT – IV

(12 Hrs.)

Functions and Functional Programming – Functions – calling functions – creating functions – passing functions – **Built-in Functions: apply(), filter(), map() and reduce() - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances.**

UNIT – V

(11 Hrs.)

Regular expressions – Files & I/O: File objects – Built in Functions – Methods – Built in Attributes – Standard files – Command line arguments – File System – File Execution –**Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, MySQL**

Text Books:

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali (2016). Introducing Data Science, Dreamtech Press, New Delhi
2. Wesley J.Chun (2012). Core Python Programming, Pearson Education Publication, United States.

Reference Books

1. Mark Lutz (2018). Programming Python, 4/e, O'Reilly Media.
2. Mark Summerfield (2009), Programming in Python 3, Pearson Education.
3. Wesley J.Chun (2016). Core Python Programming Application Programming, 3/e, Pearson Education Publication,United States

Pedagogy

Demonstration, Lectures, Group Discussion

Course Designers

1. Dr. R. Kowsalya
2. Dr. M. Sasikala

Course Number	Course Name	Category	L	T	P	Credit
AI21CP5	OPERATING SYSTEM LAB	III	-	-	45	3

Preamble

The course includes the study of Linux utilities and commands. Introduction to Linux commands and shell scripts are given in this program. Linux shell programming is dealt in depth which can be used to develop applications.

Prerequisite

- Basics of OS concepts
- Basics of Linux commands

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of file processing, directory handling and user management in operating system	K1
CLO2	Understand and create Linux shell scripts using pipes, redirection, filters, pipes and display system configuration	K2
CLO3	Apply and execute various problems in operating systems using Linux commands	K3
CLO4	Analyze real time problems using Linux shell scripts	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

List of Exercises:

- Exercises to implement system configuration using Linux shell scripts
- Exercises to implement file concepts in Linux
- Exercises using Linux shell commands
- Exercises to implement process scheduling in Linux
- Exercises to implement file processing, input and output processing using Linux commands
- Exercises to do process management and memory management in Linux environment

Pedagogy

Demonstrations

Course Designers

1. Mrs. V. Mageshwari
2. Dr. M. S. Vijaya

Course Number	Course Name	Category	L	T	P	Credit
AI21CP6	PYTHON LAB	III	-	-	60	3

Preamble

This course provides exercises in core python, advanced concepts like regular expressions, exception handling, multithreading, web programming and data base programming. It also covers exploratory data analysis and implementation of data structures.

Prerequisites

Problem Solving and Programming

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic elements, concepts and modules of python programming and data analysis	K1
CLO2	Understand the python constructs to develop programs	K2
CLO3	Apply appropriate techniques in Python to create simple applications	K3
CLO4	Analyze python packages and modules suitable for real time applications	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

List of Exercises:

1. Exercises using strings, conditional loops, functions.
2. Exercises using regular expression and dictionary
3. Exercises using lists to implement the data structure concept

4. Exercises using database connectivity
5. Exercises using Files
6. Exercises to implement graphs and charts for exploratory data analysis
7. Exercises to implement statistical methods – Correlation, Regression
8. Exercises using plots for data visualization
9. Exercises to implement data pre-processing techniques – Handling noisy data, missing values, data transformation
10. Exercises to implement outlier analysis

Pedagogy

Demonstration, Lecture, Group Discussion

Course Designers

1. Dr. R. Kowsalya
2. Dr. M. Sasikala

Course Number	Course Name	Category	L	T	P	Credit
AI21SBP1/A I21SBCE	SKILL BASED SUBJECT NOSQL DATABASES	III	-	-	45	3

Preamble

This course covers various queries in NoSQL database – MongoDB and Neo4j. This course also introduces the concepts of MongoDB and Neo4j needed to create and deploy a highly scalable and performance-oriented database.

Prerequisite

- RDBMS
- Object oriented programming

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic principles of NoSql databases and the concepts of MongoDB and Neo4j	K1
CLO2	Understand the various CRUD operations and the querying mechanisms in MongoDB and Neo4j	K2
CLO3	Apply the techniques of Neo4j and MongoDB in simple applications	K3
CLO4	Analyze the features of MongoDB and Neo4j with real time scenario	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

List of Exercises:

MongoDB

- Write a MongoDB query to create and drop database.
- Write a MongoDB query to create, display and drop collection
- Write a MongoDB query to insert, query, update and delete a document.

Implementing Aggregation

- Write a MongoDB query to use sum, avg, min and max expression.
- Write a MongoDB query to use push and addToSet expression.
- Write a MongoDB query to use first and last expression.

Replication, Backup and Restore

- Write a MongoDB query to create Replica of existing database.
- Write a MongoDB query to create a backup of existing database
- Write a MongoDB query to restore database from the backup.

Neo4j

- Exercises to create nodes, relationships, index and constraints in neo4j
- Exercises to drop an index, constraint, node and relationship in neo4j
- Exercises to implement general clauses in neo4j
- Exercises to implement return clause in neo4j
- Exercises to implement order by clause in neo4j
- Exercises to implement read clauses in neo4j
- Exercises to implement write clauses in neo4j
- Exercises to implement where clause in neo4j
- Exercises to implement string functions in neo4j
- Exercises to implement aggregate functions in neo4j

Pedagogy

Demonstration

Course Designers

1. Dr.M.S.Vijaya
2. Dr. S. Meera