



DEPARTMENT OF BCA

CHOICE-BASED CREDIT SYSTEM (CBCS)

&

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

BACHELOR OF COMPUTER APPLICATIONS

2023 – 2026 Batch

PROGRAMME LEARNING OUTCOMES (PLO's)- UG

After completion of the programme, the student will be able to

- PLO1:** Design and Develop computer based systems with strong foundation in fundamentals and clarity on both conceptual and application oriented skills of various domains.
- PLO2:** Spark the reflective thinking process in various areas like information computing sectors, teaching and innovative researches.
- PLO3:** Work independently on a substantial software projects and as an effective team member.
- PLO4:** Inculcate the self directed learning in emerging technologies to upgrade them.
- PLO5:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take up mastering programmes.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

- PSO1:** The students will obtain an attitude to understand the societal issues and apply the acquired programming skills to develop system-based application.
- PSO2:** Students are capable to comprehend the technological advancements in the usage of modern tools to satisfy industry needs.
- PSO3:** A strong foundation to pursue higher education in the fields of teaching and research.

Department of BCA

Choice Based Credit System & Learning Outcomes Based Curricular Framework
Bachelor of Computer Applications - 2023-2026 Batch
SEMESTER I -VI (2023 - 2026 Batch onwards)

Semester	Part	Subject Code	Title of the Course	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2301A/ HIN2301A / FRE2301A	Language Paper I	Language	4	58	2	3	25	75	100	3
	II	ENG2301A	English Paper I	English	4	58	2	3	25	75	100	3
	III	IN23C01	Computer Programming	CC	4	58	2	3	25	75	100	3
	III	AP23CP1	Computer Programming Lab	CC	3	45	-	3	15	35	50	2
	III	PP22C02	Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100#	-	100	3
	III	AP23C03	Operating Systems Fundamentals - Linux	CC	4	58	2	3	25	75	100	3
	III	TH23A03	Numerical and Statistical Techniques	GE	6	88	2	3	25	75	100	5
	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100#	-	100	2
		NME23A1/ NME23B1	Advanced Tamil 1 /Basic Tamil 1	AEC	2	28	2	-				
II	I	TAM2302A / HIN2302A / FRE2302A	Language Paper II	Language	4	58	2	3	25	75	100	3
	II	ENG2302A	English Paper II	English	4	58	2	3	25	75	100	3
	III	IN23C04	Computer Programming -II	CC	5	73	2	3	25	75	100	3
	III	AP23C05	Digital Computer Fundamentals	CC	4	58	2	3	25	75	100	3
	III	AP23CP2	Computer Programming Lab -II	CC	5	75	-	3	15*	35*	50	3
	III	TH23A06	Discrete Mathematics	GE	6	88	2	3	25	75	100	5
	IV		Online Course	AEC	-	-	-	-	-	-	-	Grade
	IV	NME23A2/ NME23B2	Advance Tamil II/ Basic Tamil II (outside class hours)	AEC	2	-	-	-	100	-	-	Grade
	V	23PEPS1	Professional English for Physical Sciences	AEC	2	25	5	-	100	-	100#	2

	VI	NM23GAW	General Awareness	AEC	Self Study	-	-	Online Test	100	-	-	Grade
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III	I	TAM2303A/ HIN2303A/ FRE2303A	Language III – T/H/F	L	4	58	2	3	25	75	100	3
III	II	ENG2303A	English Paper III	E	4	58	2	3	25	75	100	3
III	III	AP23C06	Core – 6: Computer Networks	CC	4	58	2	3	25	75	100	3
III	III	AP23C07	Core – 7: Data Structures using python	CC	4	58	2	3	25	75	100	3
III/ IV	III	AP23SCE1/ CS23SBGP	Coursera : Excel Skills for Data Analytics and Visualization Specialization / SBS I : Gen-AI	SEC	3	45/ 44	-/1	-	100	-	100	3
III	III	TH23A13	Allied: Optimization Techniques	GE	4	58	2	3	25	75	100	3
III	III	AP23CP3	Programming Lab-3: DBMS Lab	CC	5	75	-	3	15	35	50*	4
III	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
III	IV	NM22UHR	Universal Human Values and Human Rights #	AECC	-	-	-	-	100	-	100	Gr.
I-V	VI	16BONL1 16BONL2	Online Course - I Online Course - II	ACC	-	-	-	-	-	-	-	-
III & IV	IV		Job Oriented Course: Amazon Web service /Cisco Certified Network Associate/ Microsoft windows server administration /Microsoft Power BI	-	-	-	-	-	-	-	-	-
IV	I	TAM2304A/ FRE2304A/ HIN2304A	Tamil Paper IV / French Paper IV / Hindi Paper IV	L	4	58	2	3	25	75	100	3
IV	II	ENG2304A	English IV	E	4	58	2	3	25	75	100	3
IV	III	AP23C08	Data Mining Techniques	CC	4	58	2	3	25	75	100	3
IV	III	AP23C09	Java Programming	CC	5	73	2	3	25	75	100	4
IV	III	AP23CP4	Java Programming Lab	CC	4	60	-	3	15*	35*	50*	3

IV	III	AP23A01 / CS23A02	Digital Marketing / M-Commerce	GE	4	58	2	3	25	75	100	3
III	III	AP23SCE1/ CS23SBGP	Excel Skills for Data Analytics and Visualization Specialization / Gen-AI	SEC	3	45	-	-	100	-	100	3
IV	IV	NM23EII	Entrepreneurship and Innovation (IgniteX)	AECC	2	30	-	-	100	-	100	2
IV	IV	NM23EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr.
IV	V	COCOACT	Co-Curricular Activities	GC	-	-	-	-	-	-	100	1
I-IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I - V	VI	16BONL1 16BONL2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-
V	III	AP23C11	.Net Programming	CC	5	73	2	3	25	75	100	3
V	III	AP23C12	SoftwareProject Management	CC	5	73	2	3	25	75	100	4
V	III	AI23C10	Machine Learning	CC	5	73	2	3	25	75	100	4
V	III	AP23E01/ AP23E02	Computer Graphics/ Perl Programming	DSE	5	73	2	3	25	75	100	4
V	III	AP23CP5	.Net Programming Lab	CC	5	75	-	3	15*	35*	50	3
V	III	AP23SBP1	Data Analytics – R Programming Lab	SEC	3	41	4	-	100	-	100	3
V	III	AP21AC1/ AP21AC2	Enterprise Resource Planning / Mobile Edge Computing	ACC	SS	-	-	3	25	75	100	5\$
V	IV	NM21CS1	Cyber Security I	AECC	2	30	-	-	100	-	100	Gr.
V	VI	AP23COM	Comprehensive Examination	GC	-	-	-	-	100	-	100	Gr.

V	III	AP23INST	Field work / Institutional Training	DSE	-	-	-	-	100	-	100	2
I-IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I-V	VI	16BONL 1 16BONL 2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-
VI	III	AP23C13	Cloud Computing	CC	5	73	2	3	25	75	100	4
VI	III	AP23C14	Web Technology	CC	5	73	2	3	25	75	100	3
VI	III	AP23E03/ AP23E04	Digital Image Processing / Blockchain Technology	DSE	5	73	2	3	25	75	100	4
VI	III	AP23CP6	Web Technology Programming Lab	CC	5	75	-	3	15*	35*	50*	3
VI	III	AP21SBP3	Data Analytics - Data Visualization Tools Practical	SEC	3	41	4	-	100	-	100	3
VI	III	AP21PROJ	Project and Viva – Voce	DSE	7	-	-	3	25	75	100	5
VI	III	IN21AC3 AP16AC4	Artificial Intelligence / Internet of Things	ACC	SS	-	-	3	25	75	100	5 ^s
I-V	VI	16BONL1 16BONL2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-
I-VI	-		TOTAL	-							4000	140

Bolded content in the syllabus represents Blended learning mode.

Only Internal Assessment

*CA conducted for 25 converted to 15 *ESE conducted for 75 converted into 35

L: Language,

E: English ,

CC : Core Courses

GE: Generic Electives

AEC : Ability Enhancement Courses

SEC : Skill Enhancement

Courses CA: Continuous Assessment

Gr. : Grade

ESE : End Semester Examination

SS : Self Study

GC : General course

ACC: Additional Credit Course

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

CA Question Paper Pattern and distribution of marks UG Core and Allied - (First 3 Units)

Question from each unit comprising of (Semester I - III)

SECTION	MARKS	TOTAL
A – 3 X 2 Marks (No Choice)	06	45
B – 3 X 5 Marks (Internal Choice at the same CLO level)	15	
C - 3 X 8 Marks (Internal Choice at the same CLO level)	24	

End Semester Examination: 5 x 15 = 75 Marks (Semester I - III)

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	75
B – 5 x 5 Marks (Internal Choice at same CLO Level)	300	25	
C – 5 x 8 Marks (Internal Choice at same CLO Level)	600-800	40	

Advance Learner Courses

SECTION	MARKS	TOTAL	
Section A: 5 questions out of 8 - open choice	5 X 5	25	75
Section B: 5 questions out of 8-open choice	5 X 10	50	

Evaluation pattern for Gen-AI

Quiz	(5 quizzes with each 10 marks)	50	100
Case study	-	25	
Online Exam	-	25	

**WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF CONTINUOUS INTERNAL
ASSESSMENT (Semesters I - III)**

Theory

	CIA Test	Model Exam	Seminar/Assignment/ Quiz	Class Participation	Attendance	Max. Marks
Core / Allied	5	7	5	5	3	25

Practical

	Model Exam	Lab Performance	Regularity in Record Submission	Attendance	Maximum Marks
Core / Allied	10	7	5	3	25

*Departments can plan the above pattern according to their course as Test 1 & 2 - Theory / one theory and one practical / both as practical / one theory or practical with one project.

RUBRICS Assignment/ Quiz / Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organization: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (Converted to 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Points scored
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks Questions Occasionally	Student rarely contributes to class by offering ideas and asking no questions	Student never contributes to class by offering ideas	
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.	
Behavior	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class	
Preparation	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.	
Total						

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C01	COMPUTER PROGRAMMING	Theory	58	2	-	3

Preamble

The course covers basic knowledge of Python Programming. It defines the Conditional Statements & Loops, Functions, Tuples, Python data structures, and Exception & its tools.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the technical strengths, Python Interpreter, and program execution.	K1
CLO2	Understand the purpose of operations, strings, lists, and tuples to solve problems	K2
CLO3	Apply functions to solve problems using the procedure-oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

COMPUTER PROGRAMMING (IN23C01) – [58 Hrs]

UNIT I

(10 Hrs)

Introduction: Why do people use Python- Python a scripting language- **Users of Python- Need of Python- Python's Technical Strengths-** How Python runs programs: Introducing the Python Interpreter- Program Execution-Execution Model Variation: Python Implementation Alternatives.

UNIT II

(12 Hrs)

Types & Operations: Numbers Types: Numeric type basics, Numbers in action, Other numeric types- Strings Fundamentals: String Basics, String Literals, Strings in action, String Methods – Lists and Dictionaries-Tuples- Files.

UNIT III

(12 Hrs)

Control Flow: Statements & Syntax: Assignment - Expressions & Print- if tests – While & for loops. Functions: Function Basics: Why use functions- Coding Functions- Definition & Calls. Scopes: Python Basics-Global Statement-Scopes Nested functions. Arguments: Arguments passing Basics- Special Arguments Matching Modes.

UNIT IV

(14 Hrs)

Classes & OOP: OOP: Introduction-Class Coding Basics- Class Coding details: Class statement- **Methods-Inheritance**. Designing with classes: Python and OOP-OOP Inheritance, **Composition, Delegation-Methods and Classes act as Objects**-Multiple Inheritance.

UNIT V

(10 Hrs)

Introduction to Industry 4.0 - Need -Reasons for Adopting Industry 4.0 - Definition- Goals and Design Principles - **Technologies of Industry 4.0** - Skills required for Industry 4.0 - Advancements in Industry 4.0- **Impact of Industry 4.0 on Society, Business, Government and People** - **Introduction to 5.0.**

Text Books

1. Mark Lutz, Learning Python, O'Reilly Publication, 5th edition, 2013 (Unit I - IV).
2. P. Kaliraj, T. Devi, Higher Education for Industry 4.0 and Transformation to Education 5.0, CRC Press – Taylor and Francis Group, 1st Edition, 2021 (Unit V).

Reference Books

1. Mark Summerfield, Programming in Python 3, Pearson Education 2009.
2. Mark Pilgrim, Dive into Python 3, A press publication 2011.
3. Richard L. Halterman, Fundamentals of Python, Programming Southern Adventist University, 2017.

Pedagogy

Lectures, Group discussions, Demonstrations

Course Designer

1. Mrs.M.Selvanayaki
2. Ms. A.Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23CP1	COMPUTER PROGRAMMING LAB	PRACTICAL	-	-	45	2

Preamble

The course gives hands-on experience in Python Programming and improves the practical skill set. The learner will be able to develop the logic for the given problem and recognize and understand the syntax and construction of Python code. The course involved compiling, linking, and debugging Python code and developing some complex programs.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the basic terminologies of Python programming such as data types, conditional statements, looping statements, and functions.	K1
CLO2	Develop programs with the implementation of operators & I/O operations	K2
CLO3	Construct programs with features of Lists, Strings.	K3
CLO4	Develop readable programs with files for Exception handling concepts.	K4

Mapping with Programming Learning Outcomes

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

S- Strong; M-Medium; L-Low

COMPUTER PROGRAMMING LAB (AP23CP1) – [45 Hrs]

LIST OF EXERCISES

1. Exercise programs on basic control structures & loops.
2. Exercise programs on operators & I/O operations.
3. Exercise programs on Python Script.
4. Exercise programs on Lists.
5. Exercise programs on Strings.

6. Exercise programs on functions.
7. Exercise programs on recursion & parameter passing techniques.
8. Exercise programs on Tuples.
9. Exercise programs on file.
10. Exercise programs on Exception handling concepts.
11. Exercise program to Hash Encryption and Decryption giving data.

PEDAGOGY

Demonstration of working environment/Tools/Software/Program

COURSE DESIGNER

1. Mrs. M. Selvanayaki
2. Ms. A. Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PP22C02	COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM-SOLVING	Theory	45	-	-	3

Preamble

This course aims to kindle young minds to think like computer scientists with the idea that Computing and computers will enable the spread of computational thinking. Computational thinking is thinking recursively, reformulating a seemingly difficult problem into one which we know how to solve, and taking an approach to solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the basic principles of Logical reasoning, Problem Solving in Computational Thinking.	K1
CLO2	Understanding the applications of propositional logic, Problem representation, and techniques.	K2
CLO3	Apply algorithmic thinking to problem-solving using tools Flow algorithm, Scratch, and iPython.	K3
CLO4	Apply and analyze to solve domain-specific problems using computational thinking concepts.	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L – Low

COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM-SOLVING (PP22C02)

UNIT I

(7 Hrs)

Basics: Introduction to Computational Thinking- Data Logic - History of Computational Thinking- Applications of Computational Thinking.

UNIT II**(8 Hrs)**

Data- Information and Data - Data Encoding - Logic - Boolean logic - Applications of simple Propositional Logic. Tool: Flow Algorithm and Scratch.

UNIT III**(10 Hrs)**

Problem-Solving and Algorithmic Thinking: Problem definition- Logical reasoning- Problem decomposition- Abstraction- Problem representation via Algorithmic thinking: Name binding- Selection- Repetition and Control Abstraction- Simple Algorithms – Comparison of performance of Algorithms.

UNIT IV**(8 Hrs)**

Activities in Class: Sudoku-Towers of Hanoi- Graph Coloring-Geographical Map reading- Poem Reading-Novel reading- Data analysis on news.

UNIT V**(12 Hrs)**

Problem-Solving Techniques- Factoring and Recursion Techniques- Greedy Techniques-Divide and Conquer- Search and Sort Algorithms- Text Processing and Pattern Matching. Tool: iPython

TEXTBOOK

1. David Riley and Kenny Hunt, Computational Thinking for Modern Solver, Chapman & Hall/CRC, 2014.
2. Paolo Ferragina, Fabrizio Luccio, Computational Thinking First Algorithms, Springer, 2018.
3. Karl Beecher, Computational Thinking – A beginner's guide to problem-solving, BSC publication, 2017.

PEDAGOGY

Lectures, Group discussions, Demonstrations, Case studies

COURSE DESIGNER

Mrs. R. Jayasree

EVALUATION PATTERN

ASSESSMENT	NUMBER	MARKS
Quiz (online or offline)	5	50
Class Activity	5	25
Group Project (Domain Specific)	1	25
TOTAL		100

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C03	OPERATING SYSTEMS FUNDAMENTALS - LINUX	Theory	58	2	-	3

Preamble

This subject is designed to provide the students with a thorough discussion of the fundamentals of operating system. To explore the various memory management scheme and to perform administrative tasks on LINUX servers.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO12rt	Recall the basic concepts with functions of operating systems and Linux systems.	K1
CLO2	Understand the operating systems objectives and functionality along with system programs and system calls.	K2
CLO3	Compare and contrast various memory management schemes.	K2
CLO4	Demonstrate deadlock, prevention and avoidance algorithms, storage management, various scheduling algorithms, and shell programming.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

OPERATING SYSTEMS FUNDAMENTALS – LINUX (AP23C03) – [58 Hrs]

UNIT I (12 Hrs)

Introduction: What operating systems do - **Computer System Architecture- Operating System Operations.** Process Management: **Process Concept**-Process Scheduling- Operations on Processes-Interprocess communication.

UNIT II (12 Hrs)

Process Scheduling: **Basic Concepts- Preemptive and Non-preemptive Scheduling**-Scheduling Criteria Scheduling Algorithms (FCFS, SJF & Round Robin only). Synchronization: **Background** - The Critical Section Problem-Peterson's Solution-Semaphores-The Dining Philosopher's Problem. Deadlock: **Deadlock Characterization** - Methods Handling Deadlocks-Recovery from Deadlock.

UNIT III

(11 Hrs)

Memory Management Strategies: **Background - Contiguous Memory Allocation** - Paging-Basic Method. Virtual Memory Management: Demand Paging-Page Replacement - Basic Page Replacement, **FIFO Page Replacement**, Optimal Page Replacement, LRU Page Replacement, Counting-Based Page Replacement.

UNIT IV

(11 Hrs)

What Linux Is – Becoming a Linux Power User: About Shells and Terminal Windows - Choosing your shell - **Running Commands - Recalling Commands Using Command History**-Connecting and Expanding Commands-Using Shell Variables.

UNIT V

(12 Hrs)

Moving Around the File System: Using Basic File System Commands - Using Meta characters and Operators-**Listing Files and Directories**-Understanding File Permissions and Ownership-Moving, Copying, and Removing Files.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin, G Gagne, OPERATING SYSTEM CONCEPTS, Wiley Publishers, 10th Edition, 2018.
2. Christopher Negus, LINUX BIBLE, Wiley, 10th Edition 2020.

Reference Books

1. Archer J harries, Operating System, Tata Mc Graw Hill 2nd Edition, 2011.
2. Williams E. Shotts, The Linux Command Line: A Complete Introduction, John Wiley & Sons, 2nd Edition, 2019.
3. Jason Cannon, Linux for Beginners, Create space Independent Pub, 2014.

Pedagogy:

Lectures, Discussion, Quiz, PPT

Course Designers

1. Mrs. S.Mohanapriya
2. Mrs. T.S. Anushya Devi
3. Dr.R.Hepziba Gnanamalar

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C04	COMPUTER PROGRAMMING -II	THEORY	73	5	-	3

Preamble

- This course introduces fundamental programming constructs in C.
- It covers the concepts such as arrays, functions, structures, pointers and file handling

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the programming constructs and structure of C programming	K1
CLO2	Understand the purpose of arrays, strings, structures, pointers and files to solve problems	K2
CLO3	Apply functions to solve problems using procedure oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic	K4

Mapping with Programme Learning Outcomes

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

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

Syllabus

Unit I

(14 Hrs)

Overview of C - Constants –Variables - Keywords and Data types – Structure of C program, Compilation and Execution - Operators and Expressions - Managing Input and Output Operations - **Decision Making and Branching: Decision Making , Looping and Case Control Structure**

Unit II

(14 Hrs)

Arrays: One-Dimensional - Two Dimensional - Multidimensional Arrays. Character String Handling - Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - String Handling Functions

Unit III

(15 Hrs)

User-Defined Functions: Need - Types: Calling a Function - Category of Functions - No Arguments and No Return Values - Arguments but No Return Values - Arguments with Return Values – Nesting of Functions - Recursion – Scope Visibility and Life time of Variables.

Structure Definition: Structure Initialization - Comparison of Structure Variables - Arrays of Structures - Arrays within Structures.

Unit IV

(15 Hrs)

Pointers: Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointers - **Pointers and Arrays - Pointers and Character Strings** - Pointers and Functions.

Unit V

(15 Hrs)

File Management in C: Defining and Opening a File - Closing File - **I/O Operations on Files - Error Handling during I/O Operations** –Random Access to files - Command Line Arguments.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	E. Balagurusamy	Programming in ANSI C	McGraw Hill Education	8 th Edition, 2019

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Byron Gottfried	Programming with C	Tata McGraw Hill	3 rd Edition, 2013
2	Yashavant Kanetkar	Let us C	BPB Publications	13 th Edition, 2014
3	Martin J. Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform	2 nd Edition, 2012

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

Course Designers

1. Mrs. M. Selvanayaki

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C05	DIGITAL COMPUTER FUNDAMENTALS	Theory	58	2	-	3

Preamble

- To demonstrate the use of sequential logic circuits and their applications
- To provide an introduction to the principles and practices of Digital Circuits and Design, Boolean Algebra and Logic Gates, Arithmetic circuits Combinational Circuits, flip-flops, Counters and Registers.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic principles of digital Circuits and Logic Gates	K1
CLO2	Discussion on the design of Arithmetic, combinational Circuits, Flip-Flops and registers.	K2
CLO3	Design, construct, and evaluate logic circuit and Registers from a given digital problem.	K3
CLO4	Analyse logic circuits using logic gates and K-map simplification.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

UNIT I:

(11 Hrs)

Number System and Codes: Introduction – Number System – **Floating Point Representation of Numbers** – Arithmetic Operations – 1's and 2's Complement – 9's complement – 10's Complement – Binary Coded Decimal – Codes.

UNIT II:

(12 Hrs)

Boolean Algebra and Minimization Techniques: Introduction – Development of Boolean Algebra – Boolean Logic Operations – **Basic Law of Boolean Algebra** – Demorgans Theorems - Sum of products and Product of Sums - Karnaugh maps.

Logic Gates: Introduction – Positive and Negative Logic Designation – Logic Gates.

UNIT III:**(11 Hrs)**

Arithmetic Circuits: Introduction – Procedure for the Design of Combinational Circuits – Half Adder – Full Adder – K – Map simplification – Half Subtractor – Full Subtractor – Parallel Binary Adder – 4 bit Parallel Binary Subtractor – Controlled Inverter – 4 bit Parallel Adder/Subtractor – BCD Adder.

UNIT IV:**(12 Hrs)**

Combinational Circuits: Introduction – Multiplexers – Basic Four input Multiplexer IC 74151 8 to 1 multiplexer – IC 74150 16 to 1 Multiplexer – **Demultiplexers –** Decoders – basic binary decoder 3 to 8 decoder – 4 to 16 Decoder – Encoders – Octal to Binary Encoder – Decimal to BCD Encoder.

UNIT V:**(12 Hrs)**

Flip Flops: Introduction – Latches – Set-Reset (S-R) latch – NOR Based S-R Latch – NAND Based S-R Latch – State Diagram and Characteristic Equation of S-R Latch – Types of flip flops – S-R flip flop – D flip flop – J K flip flop -. T flip-flop.

Counters: Introduction – Asynchronous counter – Registers: Introduction – Shift Registers – Serial-in-Serial-out Shift register – Serial-in-Parallel-out Shift Register – Parallel-in-serial-out Shift Register – Parallel-in-Parallel-out Shift register.

Text Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	S. Salivahanan and A. Arivazhagan	Digital Circuits and Design	5 th Edition OXFORD University Press	2018

Reference Books:

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Morris Mano, Michael D. Ciletti	Digital Design	Pearson Edition – 6 th edition	2018
2	Subrata Ghoshal	Digital Electronics	Cengage – 2 nd Edition	2017

Pedagogy

- Chalk and Talk, PPT, Demo, Discussion, Quiz, and Assignment.

Course Designer:

1. Mrs. K.Geethalakshmi
2. Ms. A.Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23CP2	COMPUTER PROGRAMMING LAB -II	PRACTICAL	-	-	75	3

Preamble

- To provide the hands on experience on C Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code.
- To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the basic terminologies of c programming by using different data types, decision structures, loops and functions.	K1
CLO2	Understand the dynamics of memory allocation by the use of pointers and files.	K2
CLO3	Understand the concepts of Structures and Unions.	K2
CLO4	Design and develop the simple business application.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

LIST OF PROGRAMS

- Using different operators.
- Control Structures.
- Using arrays.
- String handling functions.
- User defined functions.
- Structures.
- Pointers.
- Working with files.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs. M. Selvanayagi
2. Ms. A. Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C06	COMPUTER NETWORKS	Theory	58	2	-	3

Preamble

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network and various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

Course Learning Outcomes

On Completion of the course, the students should be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identifying the basic layers and various functionalities of computer networks.	K1
CLO2	Tagging the basics of how data flows from one node to another node using different level of layers.	K2
CLO3	Determine the protocols, performance and Network Management	K3
CLO4	Integrate and design the different layering and services	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

COMPUTER NETWORKS - AP23C06

58 Hours

Syllabus

UNIT I:

(11 Hours)

Introduction And Physical Layer: Networks-**Networks Types**-Protocol Layering-TCP/IP Protocol suite:Layered Architecture-Layers in the TCP/IP Protocol Suite-Encapsulation and Encapsulation-Addressing-**Multiplexing and Demultiplexing**- The OSI Model -Physical layer: Performance.

UNIT II:

(11 Hours)

Digital Transmission: **Transmission Modes**. Switching: Introduction-Circuit Switched Networks- Packet Switching: Datagram Networks.

Data-Link Layer: Introduction-**Link Layer Addressing - Three Types of addresses**- Address Resolution Protocol (ARP). Wired LANS: Ethernet -Ethernet Protocol-**Standard Ethernet**.

Wireless LANS: Introduction-IEEE 802.11-Architecture, Bluetooth - Architecture.

UNIT III:**(12 Hours)**

Network Layers: **Network Layer Services-Packet Switching-** Network Layer Performance- IPv4 Addresses: Address Space-Classful Addressing-Classless Addressing- **Forwarding of IP Packets-** Network Layer Protocols: Internet Protocol-Datagram Format- Security of IPv4 Datagrams, ICMP V4.

UNIT IV:**(12 Hours)**

Transport Layer: **Introduction to Transport Layer. Simple Protocol-Stop-and-Wait Protocol-Transport Layer Protocols: Introduction** -User Datagram Protocol- Transmission Control Protocol-TCP Services-TCP Features-Segment-SCTP - SCTP Services - SCTP Features.

UNIT V:**(12 Hours)**

Application Layer: World Wide Web and HTTP- FTP-Telnet -Secure Shell (SSH) - **Network Management: Introduction** - SNMP-Managers and Agents - Management Components.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Behrouz A. Forouzan,	Data Communications and Networks	Tata McGraw-Hill Publishing	5 th Edition ,2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Morgan Kaufmann Publishers Inc	5 th Edition, 2012
2	William Stallings	Data and Computer Communications	Pearson Education	10 th Edition, 2013
3	Nader F. Mir	Computer and Communication Networks	Prentice Hall	2 nd Edition, 2014
4	James F. Kurose, Keith W. Ross	Computer Networking, A Top-Down Approach Featuring the Internet	Pearson Education	6 th Edition, 2013

Pedagogy

- PPT, Black board, Discussion, Self-questioning by students, Group discussion, Quiz

Course Designers:

1. Mrs. T. S. Anushya Devi
2. Dr.L.Sheeba

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C07	DATA STRUCTURES USING PYTHON	Theory	58	2	-	3

Preamble

- To get familiarize knowledge with designing an algorithm using data structures in Python.
- To articulate the essential components of data structures like Stack, Queue, List, Searching, Sorting, Merging and Trees.

Course Learning Outcomes

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

CLOs Number	CLO Statement	Knowledge Level
CLO1	Identify the appropriate and optimal data structure for a specified application.	K1
CLO2	Understand the concept of Data structures and its applications	K2
CLO3	Illustrate the use of different linear and non-linear data structures and their applications.	K3
CLO4	Design and implementation of data structure.	K4

Mapping with Programme Learning Outcomes

CLO's	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	S
CLO2	S	S	M	M	S
CLO3	M	S	M	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium;

DATA STRUCTURES USING PYTHON - AP23C07

58 Hours

Syllabus

UNIT I:

(12 Hrs)

Data Structures: Introduction – What is Data Structure? Why do we need Data Structure? – Different types of Data Structures – How to select a Data Structure? – How are Data Structures Implemented? – Real life scenarios for Data Structures – **Difference between Data Structures and Database Management Systems.**

Abstract Data Types and Analysis: Introduction - Complexity – Time Complexity and Space Complexity - Asymptotic Notation: - Big O – Big Omega – Big Theta – Small O – Small Omega – Recursion: How Recursion works? Inefficient Recursion – Analysis of Recursive functions – **Applications of Recursion.**

UNIT II:

(12 Hrs)

Linear Data Structures: Arrays – Introduction - Declaration of Arrays – Implementation: Insertion – Deletion – Merging – Some more operations – Complexity Analysis – Applications – Python Sequences.

Stack : Introduction – Working: Push Operation, Pop Operation, Top Operation – Implementation of Stack using Pointers – Applications of Stacks – Infix to Postfix Conversion – Evaluation of Prefix Expression.

Queues: Single Ended Queues – Enqueue Operation – Dequeue Operation – Front Operation – Implementation of Single Ended Queues using lists – Double Ended Queues – Push Front operation – Push Back Operation – Pop Front Operation – Pop Back Operation – Front Operation– Rear Operation – **Applications of Queues.**

UNIT III:

(11 Hrs)

Linked Lists: Introduction to Linked List – **Singly Linked List: Insert Node Operations – Delete Node Operations – Value At Operation** – Implementation of Singly Linked List – **Doubly Linked List:** Insert Node Operations – Delete Node Operations – Value At Operation – Implementation of Doubly Linked List – **Circular Linked Lists:** Insert and Delete Node Operation - Applications of Linked List.

UNIT IV:

(12Hrs)

Trees: Introduction – Definitions – Binary Trees: Types of Binary Trees – **Implementation of Binary Trees: Pointer Based Implementation** – Array based Implementation – Linked List based Implementation – Traversal: In Order Traversal – Pre Order Traversal – Post Order Traversal – Level Ordered Traversal – Basic Operations: Inserting and Deleting a Node – **Applications of Trees.**

Binary Search Trees: Introduction – Operation: Search Value – Insert a Node – Delete a Node – Implementation of Binary Trees.

UNIT V:

(11 Hrs)

Graphs: Introduction, Components of a Graph, Graph representation, **Types of Graphs.**

Sorting: Introduction – Importance of Sorting Algorithm – Exchange Sort: Bubble Sort – Selection Sort: Straight Selection Sort – **Heap Sort – Insertion Sort: Simple Insertion Sort** – ShellSort – Divide and Conquer: Merge Sort – Quick Sort.

Searching: Introduction – Linear Search: Working – Implementation – Binary Search: Working – Implementation – Tree-Based Search – Hashing

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Shriram K Vasudevan, Abhishek S Nagarajan, Karthick Nanmaran	Data Structures Using Python	Oxford University Press	1 st Edition, 2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Ellis Horowitz & Sartaj Sahani	Fundamentals of Data Structure	Galgotia Book Source	1 st Edition, 2003
2	Rance D Necaise	Data Structures and Algorithms using Python	John willey &sons	1 st Edition, 2011

Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

Course Designers

1. Mrs. K. Geethalakshmi
2. Mrs. M. Selvanayagi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23SCE1	Coursera - Excel Skills for Data Analytics and Visualization Specialization	Theory	45	-	-	3

Coursera -

Excel Skills for Data Analytics and Visualization Specialization -AP23SCE1

S.NO.	COURSE NAME	COURSE LINK
1	Excel Fundamentals for Data Analysis	https://www.coursera.org/programs/psgr-faculty-learning-program-1luew/learn/excel-data-analysis-fundamentals?specialization=excel-data-analytics-visualization
2	Data Visualization in Excel	https://www.coursera.org/programs/psgr-faculty-learning-program-1luew/learn/excel-data-visualization?specialization=excel-data-analytics-visualization
3	Excel Power Tools for Data Analysis	https://www.coursera.org/programs/psgr-faculty-learning-program-1luew/learn/excel-power-tools?specialization=excel-data-analytics-visualization

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CS23SBGP	SBS I - Gen-AI	Practical	44	1	-	3

Preamble

- The objective of this course is to understand the breadth and depth of Generative Artificial Intelligence (Gen AI) and to impart knowledge on its ethical implications, practical applications, and emerging trends.

Course Learning Outcomes

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

CLOs Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts and ethical considerations of Generative AI.	K2
CLO2	Apply AI principles in practical settings using basic AI tools and platforms	K3
CLO3	Develop advanced skills in specialized AI applications such as text analysis, natural language processing, and image recognition.	K3
CLO4	Explore emerging trends in AI, integrating advanced AI tools into diverse professional practices.	K4

Mapping with Programme Learning Outcomes

CLO's	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

S- Strong; M-Medium;

SBS I - Gen-AI - CS23SBGP

44 Hours

Syllabus

UNIT I: Introduction to Gen AI

(9 Hrs)

Understanding Gen AI: Definition and scope of Gen AI - Overview of its applications in various fields
 - Introduction to essential skills needed for Gen AI. Ethical Considerations: Discussion on ethical guidelines and responsible use of AI - Understanding the impact of AI on society and individuals.

Hands-on Activity: Exploring AI Tools

- Working with appropriate content creation Gen-AI tools to engage with ChatGPT to explore various subjects, simulate interviews, or create imaginative written content.
- Working with appropriate writing and rephrasing Gen-AI tools to drafting essays on designated topics and refining the content with improved clarity, coherence, and correctness.

UNIT II: Basic AI Concepts

(8 Hrs)

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning

Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning.

Hands-on Activity: Simple AI Projects

- Working with appropriate educational content creation Gen-AI tools to generate quizzes and flashcards based on classroom material.
- Working with appropriate language learning Gen-AI tools to practice and enhance language skills through interactive exercises and games across multiple languages.

UNIT III: AI in Practice

(9 Hrs)

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques

- Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing.

Hands-on Activity: Text and Image Projects

- Working with appropriate image processing Gen-AI tools to experiment with AI-generated images.
- Working with appropriate object recognition Gen-AI tools to identify various objects such as text, images, products, plants, animals, artworks, barcodes, and QR codes.

UNIT IV: AI for Productivity and Creativity

(9 Hrs)

AI-enhanced Productivity and creativity Tools: Overview of productivity and creativity tools enhanced with AI capabilities - Tips for integrating AI into daily tasks and workflows. AI and Jobs: Exploring how AI impacts jobs and industries - Discussion on opportunities and challenges - Exploration of AI- powered creative tools and applications.

Hands-on Activity: Productivity and Creativity

- Working with appropriate content creation Gen-AI tools to generate interactive videos / blog posts / art / drawing / music and storytelling experience.
- Working with appropriate resume generation Gen-AI tools to create professional resumes efficiently.

UNIT V: Future of Gen AI and Final Project

(9 Hrs)

Emerging Trends in Gen AI - Applications of Generative AI - Ethical and Societal Impact of Gen AI - Future Directions and Challenges - Case Studies in Generative AI.

Hands-on Activity: Trends in Gen AI

- Working with appropriate speech generation Gen-AI tools to customize synthetic speech for virtual assistance across different applications.
- Working with appropriate data analysis Gen-AI tools to perform data analysis, visualization, and predictive modeling tasks.
- Working with appropriate Gen-AI design tools to simplify the creation of visually appealing presentations.
- Working with appropriate website builder Gen-AI tools to develop professional websites with AI assistance.

Pedagogy

- Demonstration of AI Tools, Lectures and Case studies.

Course Designers

- Mrs. S. Ponmalar

Course Number	Course Name	Category	L	T	P	Credit
AP23CP3	DBMS Lab	Practical	-	-	75	4

Preamble

- The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language.
- It enables to learn database functionality on real time projects.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand basic SQL query statements	K2
CLO2	Gain knowledge on primary and foreign key constraints	K2
CLO3	Apply functions and joins on data	K3
CLO4	Demonstrate PL/SQL programming on databases and differentiate Key/value store database from relational database	K4

Mapping with Programme Learning Outcomes

CLOs	PLO 1	PLO2	PLO 3	PLO4	PLO5
CLO1	M	S	S	S	S
CLO2	S	M	S	M	S
CLO3	S	S	M	S	S
CLO4	M	S	S	S	M

S- Strong; M-Medium;

DBMS Lab - AP23CP3

75 Hours

LIST OF PROGRAMS

- A Case study and formulate the problem statement on a specific project.
- Draw ER Diagrams with entities, attributes, keys, and relationships between entities, and cardinalities.
- Draw tables with Normalization
- Perform Data Definition Language statements (Create, Alter, Drop, Truncate, Rename)
- Perform Data Manipulation Language statements (Select, Insert, Update, Delete)
- Perform Transaction Control Language and Data Control Language statements (Grant, Revoke, Commit, Rollback, Savepoint)
- Perform Data Integrity Constraints Operations (Primary key, Foreign key, Not null, Unique, Check)
- Perform Aggregate Function and Sorting
- Implement Joins Operations and Sub Queries
- Write PL/SQL program to perform Functions and Procedure
- Create a Registration form using python programming and MySQL database connectivity
- Create a Login form using python programming and MySQL database connectivity.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

- Dr. R. Hepziba Ganamalar

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C08	DATAMINING TECHNIQUES	Theory	58	2	-	3

Preamble

- To gain knowledge of data mining fundamentals, techniques, and challenges for extracting insights from large datasets.
- This covers data warehousing, OLAP operations, and web mining techniques to manipulate data mining applications.
- To provide practical sessions with Weka to apply machine learning techniques like association, classification, and clustering to real-world data.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify and explain the core concepts of Data Mining, including its definition, techniques, challenges, Methods, classification and applications.	K1
CLO2	Understand datamining techniques such as Apriori and Partition algorithms and clustering methods like partitioning and hierarchical clustering for data analysis.	K2
CLO3	Apply decision tree algorithms, data warehousing concepts, and web mining techniques to analyze and extract insights from real-world datasets.	K3
CLO4	Implement Weka to implement data loading, attribute selection, discretization, association rule mining, classification, and clustering techniques effectively.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DATAMINING TECHNIQUES - AP23C08

58 Hours

UNIT: I

(10 Hours)

Introduction: What is Data Mining? – Definition – **KDD VS Data Mining** – Data Mining Techniques – Issues and Challenges in DM – **Data Mining Application Areas**.

UNIT: II

(12 Hours)

Introduction – What is an Association Rule? – **Methods to Discover Association Rules** – Apriori Algorithm – Partition Algorithm. Clustering Techniques: Introduction – **Clustering Paradigms** – Partitioning Algorithm – Hierarchical clustering.

UNIT: III**(12 Hours)**

Decision Trees: Introduction – **What is a Decision Tree?** – Tree construction Principle –Best split – Splitting Indices – Splitting criteria – Decision Tree Construction Algorithm – **CART**.

UNIT: IV**(12 Hours)**

Data Warehousing: Introduction – **Data Warehouse Architecture** – OLAP Operations –OLAP server – ROLAP – MOLAP. Web Mining: Introduction – Web Mining – Web Content Mining – **Web Structure Mining** –Web Usage Mining – Text Mining.

UNIT: V**(12 Hours)**

Machine Learning with Weka – Getting Started – Loading the Data – **Selecting or Jittering-** Attributes – Discretization – **Association Rule Mining** – Classification Clustering.

TEXTBOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Arun k. Pujari	Data Mining Techniques (Unit I, II, III, IV)	University Press (India) Limited.	3rd Edition, 2013
2	K.P. Soman, Shyam Diwakar, V Ajay	Insight into Data Mining theory and practice (Unit V)	PHI Learning Private Ltd	2014

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	K.P.Soman, Shyam Diwaka, K.Ajay	Insight into Data Mining	Prentice Hall of India	1st Edition ,2006
2	Daniel T. Larose	Data Mining Methods & Models	Wiley Student Edition	1st Edition ,2006
3	Alex Berson, Stephen J.Smith	Data warehousing, Data mining and OLAP	Tata McGraw hill publisher	2nd Edition,2022
4	Jiawei Han, Micheline Kamber	Data Mining Concepts and Techniques	Morgan Kaufmam Publishers	2nd Edition ,2002
5	David Hand,Weikki Mannil Padhraic Smyth	Principles of Data Mining	Prentice Hall of India,	1st Edition ,2001

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDITS
AP23C09	JAVA PROGRAMMING	Theory	73	2	-	4

Preamble

- To impart the fundamental programming concepts of core java and gain exposure about inheritance, packages & collection interfaces.
- To analyse and implement exception handling & multi-threading concepts in java.

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 Object Oriented Programming and Java programming structure	K1
CLO2	Understand the usage of programming elements of Java	K2
CLO3	Apply the concepts of Java to create simple applications	K3
CLO4	Construct the Java applications & Applet for real time applications.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

JAVA PROGRAMMING – AP23C09

73Hours

UNIT I:

(15 Hrs)

JAVA Basics: Object Oriented Programming (OOP) Concepts, Features of Java language, Types of Java programs, Java Architecture- literals, integer, floating point, character, string and Boolean literals. Data types, integer, floating point, character and Boolean -variables-structure of a Java program-comments, expression, statement, type conversion, block statement, scope. **Operators - Arithmetic, Bitwise, Relational, Boolean logical and ternary operators, Operator precedence.** Control statements - if...Else, Switch, While, do...while, for, break and continue statements, comma statement.

UNIT II:

(14 Hrs)

Arrays: **One dimensional array**, multi-dimensional array, Arrays class. Classes and Objects: Defining a class, new operator and object, the dot (.) operator- method declaration and calling, constructors, instance variable hiding, method overloading, passing objects and arrays as parameter to methods.

UNIT III:

(14 Hrs)

Inheritance: **Creating sub-classes**, method overriding, final class, final methods and final variables, object destruction and garbage collection, recursion, Static method, block and variables-abstract

classes.

Packages and Interfaces: **Defining a packages**, the import statement, access modifier, defining an interface, implementing an interface.

UNIT IV:

(15 Hrs)

Exception Handling: **Types of Exceptions, Catching Exceptions**, Rethrowing Exceptions, creating your own exceptions, throws exception, finally block, checked and unchecked exceptions.

Handling I/O Files: I/O Streams, File Class and Byte Stream – Disk File Handling, FileInputStream and FileOutputStream classes- Filtered Streams, DataInputStream and DataOutputStream. Strings - The String Class, String Buffer class, String Builder class.

UNIT V:

(15 Hrs)

Multithreaded Programming: **Multitasking, Creating a Thread, States of a thread, multithreaded programming**, thread priorities, thread- join () method, controlling the threads.

JDBC and ODBC - Types of Drivers, Java SQL Package , Using a JDBC, DriverManager – Creating Connection, Connection Interface - Creating Statements, Statement Interface - Executing Statements, PreparedStatement Interface, CallableStatement Interface, ResultSet Interface.

.Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	K. Somasundaram	Introduction to Java Programming	Jaico Pub.House, Mumbai	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patrick Naughton & Hebert Schildt	The complete reference java 2	TMH 5th edition	2011
2	John R. Hubbard	Programming with java	TMH, 2nd edition	-

Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDITS
AP23CP4	JAVA PROGRAMMING LAB	Practical	4	-	60	3

Preamble

- To know how to solve basic design problems using object oriented concepts.
- To provide the hands on experience on Java Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction JAVA code.

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 construction JAVA code.	K1
CLO2	Understand and design the classes using string functions & methods.	K2
CLO3	Develop java application programs using packages & collection interfaces.	K3
CLO4	Implement the Applet and Graphics Programme	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

JAVA PROGRAMMING LAB – AP23CP4

List of Programs

- Program with Classes and Objects
- Program with String functions
- Program with Arrays
- Program with two or more constructors
- Program to implement Inheritance
- Program to implement Method overriding
- Program to implement Packages
- Program to create an interface and implement in a class
- Program to implement Exception handling
- Program to create two Threads
- Program to implement JDBC connectivity.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers:

1. Mrs. K. Geethalakshmi

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDITS
AP23A01	DIGITAL MARKETING	Theory	58	2	-	3

Preamble

- This course provides an overall understanding of the various digital marketing platforms and tools available for creating an effective digital marketing strategy. It provides technical skills to design and develop an integrated digital marketing plan for an organization.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the role of digital marketing in marketing strategy	K1
CLO2	Understand the key elements of a digital marketing strategy	K2
CLO3	Apply the role that social marketing plays in the digital marketing	K3
CLO4	Analyze common digital marketing tools such as SEO and Social media and apply conceptual frameworks of digital marketing	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DIGITAL MARKETING – AP23A01

58 Hours

Syllabus

Unit – I

(12 Hrs)

Introduction to Digital Marketing: **Introduction - Original and Development of Digital Marketing** - Internet Users: Penetration and Kind of Internet Use - Digital Marketing strategy – Digital Advertising Marketing Plan - Ethical and legal framework of Digital Marketing - **Skills Required in Digital Marketing** - Digital Advertising: Introduction - Concept of display advertising - Digital Metrics Types of Digital Ad - Targeting in digital marketing - Challenges faced by display marketing.

Unit – II

(11 Hrs)

Search Engine Advertising: Introduction – **Why pay for search advertising?** – Understanding Ad Placement – Understanding Ad Ranks – **Why is the Ad rank important?** – Create your first Ad Campaign – Google Ads Account – Best practices for creating effective Ads - Enhance your Ad Campaign – Performance Reports – E-Commerce

Unit – III

(12 Hrs)

Face book Marketing : Introduction – **Organic Marketing** – Paid Marketing – Facebook Insights LinkedIn: Introduction - LinkedIn Strategy - Content Strategy - LinkedIn Native Videos - LinkedIn Analytics - Asset Copying - LinkedIn Sales Navigator - **Emerging Platforms: Instagram.**

Unit – IV

(12 Hrs)

Search Engine Optimization: Introduction – **Search Engine – The Concept of SEO** – SEO Phases – Website Audit – Content – Social Media Reach – Maintenance – Local Search SEO– SEO Visual Search – Voice Search will change the SEO Industry – Sub domains vs Subfolders – Website Navigation - External Links – Pop-ups – **Advanced Website Features.**

Unit – V

(11 Hrs)

Mobile Marketing: Introduction – **Mobile Advertising** – Mobile Marketing Toolkit – Mobile Marketing Features – Mobile Analytics. Digital Analytics: Introduction – **Data Collection** – Key Metrics – Experience Analysis – Making Web Analytics Actionable – **Types of Tracking Code** – Competitive Intelligence.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Seema Gupta	Digital Marketing	McGraw Hill Education	2nd Edition, 2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Simon Kingsnorth	Digital Marketing Strategy: An Integrated Approach to Online Marketing .	Kogan Page	2 nd Edition, 2019
2	Dave Chaffey	Digital Marketing	Pearson	7 th Edition, 2019
3	Stephanie Diamond	Digital Marketing All-in- One for Dummies	For Dummies	1 st Edition, 2019
4	Kevin Hartman	Digital Marketing Analytics: In Theory and In Practice	Ostmen Bennett Bridge Publishing Services	2 nd Edition, 2020

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

CS23A02	M-COMMERCE	Theory	58	2	-	3
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Preamble

- This course provides an insight on M-Commerce principles and business models. It also explore the concept of mobile commerce technologies, applications, mobile payment methods, security, and ethics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental concept of E- commerce and process of business models	K1
CLO2	Understand the architecture and applications of M- Commerce	K2
CLO3	Illustrate the risks, issues, legal and security aspects in M-Commerce	K3
CLO4	Analyze the infrastructure, fraud prevention and payment methodologies and examine the legal and ethical issues in mobile commerce	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

M-COMMERCE - CS23A02

58 Hours

Syllabus

Unit – I

(12 Hrs)

Introduction to E- commerce: Introduction - **E-commerce** - E-business - Categories of E-commerce applications - Traditional and Electronic commerce - Advantages and disadvantages of E-commerce.

Business Models of E-commerce: Introduction - Business models of E-commerce- Business to Consumer (B2C) - Business to Business (B2B) -

Difference between B2C and B2B - C2C: Definition - **Characteristics and Applications of C2C EC** .

Unit – II

(11 Hrs)

Mobile commerce and WAP: Introduction to Mobile commerce - Application - Advantages of M-commerce

- **Wireless Application Protocol** - WAP Browser - Features of WAP 2.0 - **Technologies of M- commerce** .

Unit – III

(12 Hrs)

Mobile commerce Risk, Security and Payment Methods: Introduction - Security and Payment Methods -

Mobile Commerce Security - Security Mechanism - Mobile Security - Network Infrastructure and Security-

WLAN and Security - WAP and Security - Mobile commerce payment methods - **Mobile payment operations** .

Unit – IV**(12 Hrs)**

Mobile Money Infrastructure and Fraud Prevention for M- Payment: Introduction - **Requirement for authentication infrastructure for M-commerce** - Trust relationship - Requirement for Mobile commerce - Password based authentication for mobile users with support for public key technology - **M - payment value chain** - Life cycle - Operational Issues in M-Commerce payment - **Mobile payment systems** - General analysis of the payment solutions.

Unit – V**(11 Hrs)**

Legal and Ethical Issues : Introduction - **Issues related to E- commerce** - Legal issues - Taxation and E-commerce - Cyber Laws : Introduction - **Cyber laws in India** - Salient Provisions of Cyber Law - Contracting and contract Enforcement - **IT act 2000**.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. U.S. Pandey and Er. Saurabh Shukla	E- Commerce and Mobile Commerce Technologies	S.Chand & Company Pvt. Ltd 2nd Revised Edition,	2 nd Revised Edition, 2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Karabi Bandyopadhyaya	Mobile Commerce	Prentice Hall India Learning Private Limited	2013

2	Paul May	Mobile Commerce: Opportunities, Applications and Technologies of Wirele Business	Cambridge Universit Press; 1st Edition,	y 1 st Edition, 2001
3	Norman Sadeh	M-Commerce: Technologie Services, and Business Mo	John Wiley & Sons,	2003

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDI T
AP23SCE1	Excel Skills for Data Analytics and Visualization Specialization	Theory	45	-	-	3

Syllabus

Excel Skills for Data Analytics and Visualization Specialization - AP23SCE1 – 45 Hours

Excel Skills for Data Analytics and Visualization Specialization	1	Excel Fundamentals for Data Analysis	https://www.coursera.org/learn/excel-data-analysis-fundamentals
	2	Data Visualization in Excel	https://www.coursera.org/learn/excel-data-visualization
	3	Excel Power Tools for Data Analysis	https://www.coursera.org/learn/excel-power-tools

JOB ORIENTED COURSE

Title: Amazon Web Services

Duration: 60 Hrs

Introduction to Cloud Computing: Overview of Cloud Computing - Types of Cloud Computing - Advantages of Cloud Computing - Characteristics of Cloud Computing - Cloud Computing Terminology - Overview of Amazon Web Services (AWS) AWS Architecture Fundamentals - AWS Global Infrastructure - AWS Regions and Availability Zones - AWS Services Overview - AWS Management Console

Compute Services: - Amazon Elastic Compute Cloud (EC2) - Amazon Elastic Container Service (ECS) - Amazon Elastic Load Balancing (ELB) - Auto Scaling Amazon Lightsail - AWS Lambda **Storage Services:** Amazon Simple Storage Service (S3) - Amazon Elastic Block Storage (EBS) - Amazon Glacier - Amazon Elastic File System (EFS) - Amazon Storage Gateway

Networking Services : Amazon Virtual Private Cloud (VPC) - Amazon Direct Connect - AWS Elastic Load Balancing (ELB) - Amazon Route 53 - Amazon CloudFront - AWS Web Application Firewall (WAF)

Database Services : Amazon Relational Database Service (RDS) - Amazon DynamoDB - Amazon Redshift - Amazon Aurora

Security & Identity Services: Amazon Identity and Access Management (IAM) - Amazon Cognito -AWS Certificate Manager -AWS Key Management Service (KMS) - Amazon CloudHSM AWS Shield Management & Developer Tools - AWS Cloud Formation - AWS Cloud Trail - AWS Command Line Interface (CLI) - AWS Systems Manager - AWS CodeCommit - AWS CodeBuild - AWS CodeDeploy - AWS CodePipeline Amazon Kinesis - Amazon EMR - Amazon Athena - Amazon Redshift - Amazon QuickSight

Analytics Services: Application Services: Amazon Simple Queue Service (SQS) - Amazon Simple Notification Service (SNS) - Amazon Simple Workflow Service (SWF) - Amazon API Gateway - Amazon MQ - Amazon AppStream 2.0 **AWS Best Practices:** Cost Optimization - Security - Performance & Scalability - High Availability & Disaster Recovery - Operational Excellence - Automation & Continuous Delivery - Monitoring & Logging.

Title: Cisco Certified Network Associate

Duration: 60 Hrs

Network Devices - Routers - Layer 2 and Layer 3 switches - Next-generation firewalls and IPS - Access points - Controllers (Cisco DNA Center and WLC) – Endpoints –Servers – PoE - Network Topologies – Cabling – Connections and it types – Communication Protocols – Casting – Wireless Principles – Frames and Switching – MAC Tables.

Configuring VLAN – CDP and LLDP – LACP – Rapid PVST – Spanning Tree protocols – Port Forward and Block – Wireless Architectures and AP Modes - WLC, access/trunk ports, and LAG - Telnet, SSH, HTTP, HTTPS, console, and TACACS+/RADIUS –IP Connectivity - Components of routing table - Routing protocol metric - Configure

IPv4 and IPv6 static routing - Configure single area OSPFv2 - Concepts of first hop redundancy protocols - NAT using static and pools - NTP operating in a client and server mode – Configure DHCP & DNS - SNMP - Syslog - Configure and verify DHCP client and relay - per-hop behavior (PHB) - Remote access using SSH - TFTP/FTP in the network

Concepts of Security threats, vulnerabilities, exploits, and mitigation - security program elements - Configure and verify device access control using local passwords - security password policies elements - IPsec remote access and site-to-site VPNs - Configure and verify access control lists - Configure and verify Layer 2 security features DHCP snooping, dynamic ARP inspection, and port security - wireless security protocols WPA, WPA2, and WPA3 - Configure and verify WLAN within the GUI using WPA2 PSK

Automation and Programmability - Control plane and Data plane - Northbound and Southbound APIs - REST-based APIs (CRUD, HTTP verbs, and data encoding) - Puppet, Chef, and Ansible - Recognize components of JSON-encoded data

Title: Microsoft Windows Server Administration

Duration: 60 Hours

Manage Microsoft Entra users and groups - Create users and groups -Manage user and group properties - Manage licenses in Microsoft Entra ID -Manage external users -Configure self-service password reset (SSPR) - Manage access to Azure resources -Manage built-in Azure roles -Assign roles at different scopes - Interpret access assignments

Manage Azure subscriptions and governance: Implement and manage Azure Policy -Configure resource locks - Apply and manage tags on resources -Manage resource groups -Manage subscriptions -Manage costs by using alerts, budgets, and Azure Advisor recommendations -Configure management groups -Implement and manage storage (15–20%) -Configure access to storage -Configure Azure Storage firewalls and virtual networks - Create and use shared access signature (SAS) tokens -Configure stored access policies -Manage access keys - Configure identity-based access for Azure Files

Configure and manage storage accounts: Create and configure storage accounts -Configure Azure Storage redundancy -Configure object replication -Configure storage account encryption -Manage data by using Azure Storage Explorer and AzCopy - Configure Azure Files and Azure Blob Storage -Create and configure a file share in Azure Storage -Create and configure a container in Blob – Storage - Configure storage tiers - Configure snapshots and soft delete for Azure Files - Configure blob lifecycle management - Configure blob versioning

Automate deployment of resources by using Azure Resource Manager (ARM) templates or Bicep files: Interpret an Azure Resource Manager template or a Bicep file - Modify an existing Azure Resource Manager template - Modify an existing Bicep file - Deploy resources by using an Azure Resource Manager template or a Bicep file - Export a deployment as an Azure Resource Manager template or convert an Azure Resource Manager template to a Bicep file

Create and configure virtual machines: Create a virtual machine - Configure Azure Disk Encryption - Move a virtual machine to another resource group, subscription, or region - Manage virtual machine sizes - Manage virtual machine disks - Deploy virtual machines to availability zones and availability sets - Deploy and configure an Azure Virtual Machine Scale Sets

Provision and manage containers in the Azure portal: Create and manage an Azure container registry - Provision a container by using Azure Container Instances - Provision a container by using Azure Container Apps - Manage sizing and scaling for containers, including Azure Container Instances and Azure Container Apps

Create and configure Azure App Service

Provision an App Service plan - Configure scaling for an App Service plan - Create an App Service - Configure certificates and Transport Layer Security (TLS) for an App Service - Map an existing custom DNS name to an App Service - Configure backup for an App Service - Configure networking settings for an App Service - Configure deployment slots for an App Service - Implement and manage virtual networking (15–20%)

Configure and manage virtual networks in Azure: Create and configure virtual networks and subnets - Create and configure virtual network peering - Configure public IP addresses - Configure user-defined network routes - Troubleshoot network connectivity

Configure secure access to virtual networks: Create and configure network security groups (NSGs) and application security groups - Evaluate effective security rules in NSGs - Implement Azure Bastion - Configure service endpoints for Azure platform as a service (PaaS) - Configure private endpoints for Azure PaaS

Configure name resolution and load balancing: Configure Azure DNS - Configure an internal or public load balancer - Troubleshoot load balancing - Monitor and maintain Azure resources (10–15%)

Monitor resources in Azure: Interpret metrics in Azure Monitor - Configure log settings in Azure Monitor - Query and analyze logs in Azure Monitor - Set up alert rules, action groups, and alert processing rules in Azure Monitor - Configure and interpret monitoring of virtual machines, storage accounts, and networks by using Azure Monitor Insights - Use Azure Network Watcher and Connection Monitor

Implement backup and recovery: Create a Recovery Services vault - Create an Azure Backup vault - Create and configure a backup policy - Perform backup and restore operations by using Azure Backup - Configure Azure Site Recovery for Azure resources - Perform a failover to a secondary region by using Site Recovery - Configure and interpret reports and alerts for backups

Provision and manage containers in the Azure portal: Create and manage an Azure container registry - Provision a container by using Azure Container Instances - Provision a container by using Azure Container Apps - Manage sizing and scaling for containers, including Azure Container Instances and Azure Container Apps

Create and configure Azure App Service: Provision an App Service plan - Configure scaling for an App Service plan - Create an App Service - Configure certificates and Transport Layer Security (TLS) for an App Service - Map an existing custom DNS name to an App Service - Configure backup for an App Service -

Configure networking settings for an App Service - Configure deployment slots for an App Service

Monitor resources in Azure: Interpret metrics in Azure Monitor - Configure log settings in Azure Monitor - Query and analyze logs in Azure Monitor -Set up alert rules, action groups, and alert processing rules in Azure Monitor - Configure and interpret monitoring of virtual machines, storage accounts, and networks by using Azure Monitor Insights -Use Azure Network Watcher and Connection Monitor

Configure and manage virtual networks in Azure: Create and configure virtual networks and subnets - Create and configure virtual network peering -Configure public IP addresses -Configure user-defined network routes -Troubleshoot network connectivity

Implement backup and recovery: Create a Recovery Services vault -Create an Azure Backup vault -Create and configure a backup policy -Perform backup and restore operations by using Azure Backup -Configure Azure Site Recovery for Azure resources -Perform a failover to a secondary region by using Site Recovery - Configure and interpret reports and alerts for backups.

Title : Microsoft Power BI

Duration : 60 Hrs

Introduction to Power BI and Data Analysis : Introduction to Power BI: Overview of Power BI features and capabilities- Importance of data visualization in decision-making - Fundamentals of Data Analysis - Roles in Data Analysis - Tasks of a Data Analyst: Data collection, cleaning, and transformation - Creation of meaningful visualizations and reports - Extracting actionable insights from data. CRISP DM FRAMEWORK. Using Power BI - Building Blocks of Power BI- Understanding Power BI Desktop and Power BI Service - Differentiating between datasets, reports, and dashboards Collaborative aspects of Power BI, including sharing and collaboration.

Data Cleaning and Transformation in Power BI : Data Acquisition in Power BI - Importing data from various sources - Data transformation and cleaning techniques - Connecting Power BI to relational databases - Importing and querying data from SQL Server and other relational databases.

Data Modelling and DAX Functions :Creating Calculated Columns - Understanding the need for calculated columns - Hands-on exercises on creating and using calculated columns - Exploring Time-Based Data - Handling date and time data in Power BI - Time-based calculations and analysis. DAX Calculations in Data Analysis - Guidelines for choosing and implementing DAX calculations - Practical applications and examples. Star Schema Design - Understanding star schema and its advantages - Implementing star schema in Power BI data models.

Data Visualization in Power BI : Writing DAX Formulas - In-depth exploration of DAX syntax and functions - Advanced DAX calculations for complex data analysis. Designing Detailed Reports - Advanced report design techniques - Utilizing features like tooltips and drill-throughs. Statistical Analysis in Power BI- Advanced statistical functions in DAX - Use of advanced visuals for statistical insights. Creating Dashboards in Power BI - Detailed steps for creating interactive dashboards.

Power BI Services vs Desktop : Configuring Row-Level Security - Implementing security measures at the row level - Best practices for securing sensitive data. Setting Up Data Alerts - Configuring alerts for monitoring changes - Troubleshooting common alert issues. Preparing for PL-300 - Model the Data - Overview of PL-300 exam and key concepts - Practical exercises and scenarios for data modelling.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23C11	.NET PROGRAMMING	Theory	73	2	-	3

Preamble

- The course is designed for the beginners as a guide to develop applications using VB.Net and ASP.Net
- This course is developed to provide the understanding of Dot Net framework, VB.Net, ASP.Net and XML.
- This course is designed to develop the programming skills to create Windows and Web based Application using VB.Net and ASP.Net respectively.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the concepts of .Net Frame Work.	K1
CLO2	Understand the concepts of client and server-side scripting.	K2
CLO3	Integrate the Web Applications.	K3
CLO4	Illustrate the Industry defined problem and suggest solution(s) using .NET application.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

.NET PROGRAMMING - AP23C11

73 Hours

UNIT I:

15 Hrs

Introduction to .Net: .Net Framework – Visual Basic .Net – **Creating windows forms applications**

– creating a web forms application – **Data types and variables** – Operators –Arrays - Conditional Logic.

UNIT II:

15 Hrs

Procedures – Dialog Boxes – Error Handling– Visual Basic .Net IDE – Controls– **Specific controls-** Irregular forms

UNIT III:

14 Hrs

Data Access: Introduction to Data Access in .Net – **Overview of ADO.Net** - ADO .Net - Visual Studio .Net Database Tools.

UNIT IV:

14 Hrs

Introduction to XML in .Net - Introduction to Web Development - **Introduction toASP.Net** – Page framework.

UNIT V:**15 Hrs**

Web Controls – Validation Control – **Events** – **Cascading Style sheets** – ASP.Net applications.

TEXT BOOK

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	Bill Evjen, Jason Beres	Visual Basic .Net Programming Bible	Wiley Publishing	2006 , 1 st Edn

REFERENCE BOOKS

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	David Chappell	Understanding .NET	Pearson Education	2002, 1 st Edn
2	Steven Holzner	VB.Net ProgrammingBlack book	Dreamtech	2005, 1 st Edn
3	Matt J. Couch	ASP. NET and VB.NET Web programming	Pearson Education	2002, 1 st Edn

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

COURSE DESIGNERS

1. Mrs. S. Mohana Priya
2. Mrs. K. S. Kamalam

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23C12	SOFTWARE PROJECT MANAGEMENT	Theory	73	2	-	4

Preamble

- This course is designed to provide the graduates to identify key areas of concern over Project Life Cycle (PLC) and use of project management principles across all the phases of PLC.
- The course will also help student to make them understand the importance and necessity of project plan and how it is helpful to project manager in monitoring and controlling the various aspects of the project such as schedule, budget, etc.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the different activities of Software Project Management Plans	K1
CLO2	Understand the different approaches to manage software development process	K2
CLO3	Select the appropriate model or technique for the project management activities.	K2
CLO4	Apply the software project management concepts in real-time Scenarios	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

SOFTWARE PROJECT MANAGEMENT – AP23C12

73 hours

UNIT I:

14 Hrs

Introduction to Software Project Management, Why is software project management important?, What is Project, Software Project vs other types of project, Activities covered by Software Project Management Plans, Methods and Methodologies, Categorizing software Projects, Stakeholder, Setting Objectives, Project success and Failure, **What is Management? Management Control, Traditional and modern Project Management Practices.**

UNIT II:

15 Hrs

An overview of Project Planning: Step 0 to 10, Selecting of an Appropriate Project Approach: Choosing methodologies and Technologies, Software Processes and Software Models, The Waterfall Model, The Spiral Model, Software Prototyping, other ways of categorizing prototypes, Incremental Delivery, **RAD and Agile Methods: Extreme programming, Scrum.**

UNIT III:**15 Hrs**

Software Effort Estimation: Introduction, Where are Estimates Done? **Software Effort Estimation Techniques, Bottom up Estimating**, The Top Down Approach, Expert Judgement, Function Point Analysis, COCOMO Model, Activity Planning.

UNIT IV:**15 Hrs**

Risk Management: Risk, Categories of Risk, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, **Risk Management**, Applying PERT Technique. Resource Allocation.

UNIT V:**14 Hrs**

Monitoring and Control, **Managing People in Software environments.**

Text Book

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	Bob Hughes, Mike Cotterell, Rajib Mall	Software Project Management	Tata McGraw Hill Publications,	2011, 5 th Edn.

Reference Books

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	Roger S. Pressman	Software Engineering	Tata McGraw Hill Publications	2014, 7 th Edn.
2	Richard H. Thayer	Software Engineering and Project Management	Wiley publication	2010, 2 nd Edn.
3	S.A.M. Rizvi, Pankaj Agarwal	Principles of Software Project Management	Khanna Book Publishing	2012, 1 st Edn
4	Walker Royce	Software Project Management- A Unified Framework	Pearson publication,	2002, 1 st Edn

PEDAGOGY

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

Unit	Topic	Activity	Web Resources
Unit I	What is Management? Management Control, Traditional and modern Project Management Practices.	Debate	https://www.tutorialspoint.com/software_engineering/software_project_management.html https://www.slideshare.net/vinodaphec/spm-tutorials https://www.geeksforgeeks.org/software-engineering-project-management-process/ https://www.guru99.com/project-
Unit II	RAD and Agile Methods: Extreme programming, Scrum.	Role play	
Unit III	Software Effort Estimation Techniques, Bottom up Estimating,	Seminar	
Unit IV	Risk Management,	Case study	

Unit V	Managing People in Software environments.	Group Discussion	management-methodology.html
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COURSE DESIGNER

□□ Mrs.K.Geethalakshmi

□□ Dr.S.Reshmi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AI23C10	MACHINE LEARNING	Theory	73	2	-	4

Preamble

- This course introduces the fundamentals of Machine Learning and its algorithms.
- It also covers various supervised and unsupervised learning algorithms used for classification, prediction and clustering.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basics of machine learning techniques	K1
CLO2	Understand the techniques of machine learning.	K2
CLO3	Apply supervised and unsupervised learning algorithms for classification, prediction and clustering	K3
CLO4	Analyze the efficiency of machine learning algorithms suitable for applications.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

MACHINE LEARNING - AI23C10
SYLLABUS

73 Hours

UNIT I

14 Hrs

The Machine Learning Landscape: Introduction to Machine Learning - Why Use Machine Learning? - Examples of Applications - Types of Machine Learning systems – Main Challenges of Machine Learning – Testing and Validating - Classification and Prediction - **The Role of Python in Machine Learning - Anaconda in Python - Python Libraries.**

UNIT II:**15 Hrs**

Classification: MNIST - Training a Binary Classifier - Performance Measures: Measuring Accuracy Using Cross-Validation - Confusion Matrix - Precision and Recall - Precision/Recall Trade-off - The ROC Curve. Multiclass Classification - Multilabel Classification - Multi Output Classification - Classification Tree. **Advanced Machine Learning: Scikit-Learn Library for Machine Learning - Cross- Validation. Support Vector Machine: Linear SVM Classification – Nonlinear SVM Classification.**

UNIT III:**15 Hrs**

Linear Regression: Simple Linear Regression – Steps in Building a Regression Model – Building Simple Linear Regression Model – Multiple Linear Regression: Developing Multiple Linear Regression Model Using Python – **Categorical Encoding Features - Splitting the Dataset into Train and Validation Sets - Building the Model on a Training Dataset** – Logistic Regression.

UNIT IV:**14 Hrs**

Unsupervised Learning Techniques: Clustering – K-Means Clustering – Limits of K-Means – Clustering for Image Segmentation - Clustering for Preprocessing - Clustering for Semi-Supervised Learning – DBSCAN – **Other Clustering Algorithm. Creating Product Segments Using Clustering - Hierarchical Clustering.**

UNIT V:**15 Hrs**

Forecasting: Forecasting Overview - Components of Time-Series Data. Recommender Systems: Overview – Association Rules – Applying Association Rules. Text Analytics: Overview – Sentiment Classification - **Naïve-Bayes Model for Sentiment Classification. Introduction to Artificial Neural Networks with Keras: From Biological to Artificial Neurons.** Deep Computer Vision Using Convolutional Neural Networks: Convolutional Layers.

TEXT BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Manaranjan Pradhan, U.Dinesh Kumar	Machine Learning using Python	Wiley India,	2019,1 st Edn
2	Aurélien Géron	Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow Concepts, Tools, and Techniques to Build Intelligent System	O'Reilly Media, Inc.	2019,2 nd Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Tom M Mitchell	Machine Learning	Tata McGraw-Hill, New Delhi	2017,1 st Edn, 2017

2	Anuradha Srinivasa Raghavan, Vincy Joseph	Machine Learning	Wiley India	2019, 1 st Edn
3	Zsolt Nagy	Artificial Intelligence and Machine Learning Fundamentals	Packt publisher	2018, 1 st Edn
4	Dr. S Sridhar, Dr. M Vijayalakshmi	Machine Learning	Oxford University Press	2021, 1 st Edn

PEDAGOGY

Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

COURSE DESIGNERS

1. Mrs. K.Geethalakshmi
2. Mrs.T.S.Anushya Devi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23E01	COMPUTER GRAPHICS	Theory	73	2	-	4

Preamble

The objective of the course is to gain knowledge and understand the latest innovations in computer graphics.

Course Learning Outcomes

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of different Computer Graphics System and applications.	K1
CLO2	Understand the concept of drawing, clipping algorithm and geometrical transformation.	K2
CLO3	Illustrate the various Algorithmic concepts of 2D and 3D graphics system.	K2
CLO4	Apply the various Algorithmic concept to create interactive Graphics system.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

COMPUTER GRAPHICS - AP23E01 SYLLABUS

73 Hours

UNIT I:

14 Hrs

Basic Concepts: - Introduction – **Uses of computer graphics – Display devices** -, CRT, Color CRT monitors – Inherent memory devices – Direct view storage tube – Flat panel displays –Three-dimensional viewing devices, Raster scan system, **Random scan system.**

UNIT II:**15 Hrs**

Line drawing algorithm – **Simple DDA** – Bresenham’s line drawing algorithm – circle generation. Two-dimensional transformations: Basic transformations, **Matrix representation** - Composite transformation of translation, rotation, scaling – Pivot, **point rotation – fixed point scaling**, other transformation.

UNIT III:**15 Hrs**

Clipping and Windowing: Point clipping –Line clipping – Sutherland – Liang Barsky - Hodgeman polygon clipping – Text clipping – **Viewing transformation – Windowing transformation.**

UNIT IV:**14 Hrs**

Graphical input devices: – Pointing and Positioning – **keyboard, mouse, trackball, joystick, scanner, light pens, and tables.** Three-dimensional input devices: - **printers and plotters.** Three-dimensional concepts: - Three-dimensional display methods – Three-dimensional transformation – translation, rotation, scaling – Three-dimensional viewing – **Viewing pipeline –Viewing coordinates** – Projections.

UNIT V:**15 Hrs**

Hidden surface removal - Object space methods – Back face detection method – Painter’s algorithm – Image space methods – **Area subdivision – Octree** – Depth – buffer – Scan line – Ray tracing, Surface renderings – **Surface textures – Shading.**

TEXTBOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION /
1	Donald Hearn & M. Pauline Baker	Computer Graphics – C Version	Pearson Education	2013, 2 nd Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Phsdtuilip J. Schneider, David H. Eberly	Geometric Tools for Computer Graphics	Morgan Kaufmann Publishers	2016, 2 nd Edn,
2	William M.Newman, Robert F. Sproull	Principles of Interactive Computer Graphics	Tata McGraw Hill	2002, 2 nd Edn,
3	James D.Foley, Andries Van Dam, Steven K. Feiner, John F.Hughes	Computer Graphics Principles and Practice	Pearson Education, Inc	2002, 2 nd Edn
4	David F. Rogers	Procedural Element for Computer Graphics	Tata McGraw Hill	2001, 2 nd Edn
5	ISRD group	Computer graphics	THM publications	2012,11 th Edn

6	John F.Hughes, Andries Van Dam, Morgan Mcguire, David F.Sklar,James D.Foley, Steven K.Fenier, Kurt Akeley	Computer Graphics Principles and Practice	Pearson Education,	2014, 3 rd Edn
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PEDAGOGY

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

COURSE DESIGNERS

1. Mrs. T.S.Anushya Devi
2. Dr. L. Sheeba

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23E02	PERL PROGRAMMING	Theory	73	2	-	4

Preamble

To provide an understanding of application of Perl programming in general as well as in biological problem solving in addition to the basic Perl working environment.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic of Perl control structures, subroutines and modules.	K1
CLO2	Identify the Regular expression and Various Operations in Perl	K2
CLO3	Implement the Perl modules, Formatting and debugging the Commands	K3
CLO4	Determine and execute the Perl regular expression, commands using Perl control structures.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

PERL PROGRAMMING - AP23E02

73 Hours

SYLLABUS

UNIT I

15 Hrs

Introduction to Perl: Scalars: Introduction - Learning Perl: A Functional Approach - **Constructing atgc.pl** - The tr /// Function - Text Formatting - Formatting Numerical Output with printf-Trapping Errors at Run-time - The s /// Operators - **The chop and chomp Operators.**

UNIT II

14 Hrs

Introduction to Perl: Arrays Introduction - jobs.pl - The split Function - The foreach Loop Using Standard Perl Modules: Introduction to Perl Modules - **The Getopt::Long Module** – The LWP::Simple Module-Capturing Data with Regular Expressions - The Perl Dot(.) Character - Filtering Job Description with regexs- **Case-insensitive Regular Expressions Matching.**

UNIT III

15 Hrs

Perl regular expressions: **Regular expression** – special character (+) - special character (*) special character (?) Special character ([])-multiline regexs: The s Option. The Perl Debugger: Debugging Perl Code-**The Perl Debugger** –The \$array Variable-Setting Conditional Break-Points. Useful Debugger Commands.

UNIT IV

14 Hrs

Perl Regular Expressions–II: Introduction – a summary of regex operation – pattern modifier operators – **conditional matching operators** – special characters – using the range of operators to exclude the alternatives – regex pattern comments – match quantifiers – **beginning of the pattern and end of the pattern anchors** – s///Revisited –tr///revisited- escape sequences for special characters.

UNIT V

15 Hrs

Perl control statements: Perl control structures – syntax and operation of if statements – if statements – if _else statements – if _else if statement – if _elseif _else – unless modifier – the while loop – the until loop – the for loop – the for each loop. File I/O:opening files: The file variable – file mode – file test operators –**accessing file with <> -accessing file with the @ARGV variable** - Accessing file with perl modules: getopt::Long &getopt::std – extracting file information with file:: Basename – deleting files – **accessing directories – the CWD module.**

TEXTBOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Harshawardhan P Bal	Perl Programming for Bioinformatics	Tata McGraw Hill publication	2003, 1 st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	James Tisdall	Beginning Perl for Bioinformatics	O'Reilly	2014, 1 st Edn
2	James Tisdall	Mastering Perl for Bioinformatics	O'Reilly	2010, 1 st Edn
3	James Lee	Beginning Perl	Apress	2004, 1 st Edn

PEDAGOGY

- Demonstration, Discussion, Interactive Teaching, Group discussion, Quiz

COURSE DESIGNER

- Dr. L.Sheeba
- Mrs.S.Kavitha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23CP5	.NET PROGRAMMING LAB	Practical	-	-	75	3

Preamble

- To provide the knowledge about .Net framework and set up a programming environment for ASP .Net programs.
- The learner will be able to use ASP.Net controls in web applications.
- The learner will be able to implement database connectivity.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Demonstrate advanced features and controls of .Net programming.	K1
CLO2	Develop windows applications and web applications in .Net framework by analysing user requirements.	K2
CLO3	Design GUI Applications	K3
CLO4	Utilize the .Net framework to build distributed enterprise applications.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

.NET PROGRAMMING LAB - AP23CP5

75 hours

LIST OF PROGRAMS:

- Simple form Design with controls in VB .Net
- Windows application using controls structures and Arrays.
- Creation of menus.
- Mouse events using VB.Net.
- Implementing Message Box and Input Box functions.
- Validation controls in VB .Net
- Web controls in ASP .Net
- Validation control in ASP.Net.

- Implementing data grid.
- Web page creation using ASP.Net.
- Database connectivity program using ASP.Net.

PEDAGOGY

- Demonstration of working environment / Tools / Software / Program

COURSE DESIGNERS

1. Mrs. S. Mohana Priya
2. Mrs. K. S. Kamalam

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23SBP1	DATA ANALYTICS - R PROGRAMMING LAB	Practical		4	41	3

Preamble

- This course is used to understand the concepts used to perform vector operations and matrix operations.
- It familiarizes the students with various statistics operations mean, median etc., are performed.
- It enables the student to explore data from a variety of sources by building regression model and to generate charts, graphs, and other data representations.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1.	Understand the fundamental syntax of R through demonstrations, and writing R code	K2
CLO2.	Apply concepts such as data types, iteration, control structures, functions, and Boolean operators using R	K2
CLO3.	Able to import a variety of data formats into R using R Studio	K3
CLO4.	Explore data-sets to perform appropriate statistical tests using R and generate charts & graphs visualization using R	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

DATA ANALYTICS - R PROGRAMMING- AP23SBP1

(41Hrs)

List of Programs

1. Create two vectors. Perform arithmetic addition and sort it in ascending and descending order.
2. Find the Mean, median and Mode for the values given in vector.
3. Write an R program to merge two given lists into one list.
4. Write an R program to find all elements of a given list that are not in another given list.
5. Write an R program to create an ordered factor from data consisting of the names of months.
6. Write an R program to convert a given pH levels of soil to an ordered factor.

7. Write an R program to create inner, outer, left, right join (merge) from given two data frames.
8. Write an R program to save the information of a data frame in a file and display the information of the file.
9. Write an R program to create two 2x3 matrix and add, subtract, multiply and divide the matrixes.
10. Finding the transpose of a matrix by using the t() function and by iterating over each value using Loops
11. Write a program using R bar plot to display maximum temperature in a week
12. Write a R histogram program to plot Maximum Daily Temperature at La Guardia Airport
13. Create a scatter plot and scatter plot matrix on the dataset MT Cars.
14. Write an R program to display the temperature of each month using a boxplot
15. Write an R program to display monthly expenditure in a Pie chart.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers:

1. Mrs. S. Mohana Priya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP21AC1	ALC: ENTERPRISE RESOURCE PLANNING	Theory	-	-	-	5

Preamble

To provide an overview of an enterprise-wide software solution that integrates and automates business functions of an organization and implementation of various Modules.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of ERP implementation methodology and different modules	K1
CLO2	Understand the concepts of ERP Technologies	K2
CLO3	Apply the acquired knowledge in real-time scenario	K3
CLO4	Analyse the present and future directions in ERP	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

ALC: ENTERPRISE RESOURCE PLANNING - AP21AC1

SYLLA

BUS

UNIT I:

INTRODUCTION TO ERP: Overview – Benefits of ERP – ERP and Related Technologies.

UNIT II:

ERP IMPLEMENTATION: Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation.

UNIT III:

BUSINESS MODULES: Business Modules in an ERP Package – Human Resource – Plant Maintenance – Quality Management – Sales and Distribution.

UNIT IV:

ERP MARKET: ERP Market Place – SAP AG – Oracle Corporation – QAD – System Software Associates.

UNIT V:

ERP – PRESENT AND FUTURE: Turbo Charge the ERP System – EIA – ERP and Internet.

TEXT BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Alexis Leon	ERP Demystified	Tata McGraw Hill	2014, 3 rd Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Joseph A. Brady, Ellen F. Monk, Bret J.Wangner	Concepts in Enterprise Resource Planning	Thomson Learning	2001, 1 st Edn
2	Vinod Kumar Garg and N.K.Venkata Krishnan	Enterprise Resource Planning – Concepts and Planning	Prentice Hall	2003, 2 nd Edn
3	Jose Antonio Fernandz	The SAP R /3 Hand book	Tata McGraw Hill	2000, 2 nd Edn

COURSE DESIGNER

1. Mrs. K.Geethalakshmi
2. Mrs. M.Selvanayagi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP21AC2	ALC: MOBILE EDGE COMPUTING	Theory	-	-	-	5

Preamble

- Learn comprehensive, self-contained knowledge on Mobile Edge Computing (MEC) - 5G/6G and the Internet of Things ideas and best practices - Achieving intelligence in next generation wireless communications and computing networks - Centralized computing mechanisms incur high latency and network congestion.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Learn basic concepts of MEC, to explore the promising application scenarios of MEC integrated with emerging technologies	K1
CLO2	Utilize insights into the possible future directions of MEC, MEC models and applications in different scenarios.	K2
CLO3	Analyse how MEC meets blockchain, artificial intelligence, and distributed machine learning.	K3
CLO4	Interpret emerging applications of MEC in a pandemic, the Industrial Internet of Things, and disaster management.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

ALC: MOBILE EDGE COMPUTING - AP21AC2 SYLLA

BUS

UNIT 1

Introduction: Mobile Cloud Computing (MCC) - Overview of MEC - Mobile Edge Computing: A Hierarchical Architecture of Mobile Edge Computing (MEC) - Computation Model: Computation Model of Local Execution - Computation Model of Full Offloading - A Computation Model for Partial Offloading - Offloading Policy : Binary Offloading - Partial Offloading - Challenges and Future Directions.

UNIT II

3 Mobile Edge Caching : Introduction - The Architecture of Mobile Edge Caching - Caching Performance Metrics : Hit Rate Ratio - Content Acquisition Latency - Quality of Experience (QoE) - Caching System Utility Caching Service Design and Data Scheduling Mechanisms : Edge Caching Based on Network Infrastructure Services - Edge Caching Based on D2D Services - Hybrid Service-Enabled Edge Caching - Case Study: Deep Reinforcement Learning-Empowered Social-Aware Edge Caching : System Model - Numerical Results.

UNIT III

Mobile Edge Computing for Beyond 5G/6G: Fundamental Characteristics of 6G - Integrating Mobile Edge Computing (MEC) into 6G: Motivations, Applications, and Challenges : Use Cases of Integrating MEC into 6G - Applications of Integrating MEC into 6G - Challenges of Integrating MEC into 6G - Case Study: MEC-Empowered Edge Model Sharing for 6G : Sharing at the Edge: From Data to Model - Architecture of Edge Model Sharing - Processes of Edge Model Sharing.

UNIT IV

5 Mobile Edge Computing for the Internet of Vehicles : Introduction - Challenges in VEC - Architecture of VEC - Key Techniques of VEC : Task Offloading - Heterogeneous Edge Server Cooperation - AI-Empowered VEC - A Case Study: Predictive Task Offloading for Fast-Moving Vehicles - Mobile Edge Computing for UAVs : Unmanned Aerial Vehicle-Assisted Mobile Edge Computing (MEC) Networks - Joint Trajectory and Resource Optimization in UAV-Assisted MEC Networks : Resource Allocation and Optimization in the Scenario of a UAV Exploiting MEC Computing Capabilities - Resource Allocation and Optimization in the Scenario of a UAV Serving as a Computing Server.

UNIT V

The Future of Mobile Edge Computing: The Integration of Blockchain and Mobile Edge Computing (MEC): The Blockchain Structure - Blockchain Classification - Integration of Blockchain and MEC - Edge Intelligence: The Convergence of AI and MEC: Federated Learning in MEC - Transfer Learning in MEC - MEC in Other Applications: MEC in Pandemics - MEC in the Industrial IoT (IIoT) - MEC in Disaster Management.

TEXT BOOK:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Yan Zhang	Mobile Edge Computing	Springer International Publishing	2022, 1 st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Anwesha Mukherjee, Debashis De, Rajkumar Buyya, Soumya K. Ghosh	Mobile Edge Computing	Springer International Publishing	2021, 1 st Edn
2	Gerardus Blokdyk	Mobile Edge Computing A Complete Guide	5 STAR Cooks Publishers	2019, 1 st Edn

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
NM21CS1	CYBER SECURITY 1	Theory	30	-	-	Grade

Preamble

- This course introduces fundamental concepts of Cyber Security in the digital era. It provides knowledge of cybercrimes, cyber laws and also the security of digital devices. It helps to do secure digital transactions and safe usage of social media.

CYBER SECURITY 1- NM21CS1 SYLLABUS

30 Hours

UNIT I

6 Hrs

Principles of Cyber security: Introduction to Cyber security - Defining cyberspace - Architecture of cyberspace - Communication and web technology - Internet infrastructure for data transfer and governance - Regulation of cyberspace - Concept of Cyber security - Issue and challenges of cyber security.

UNIT II

6 Hrs

Cyber Crime: Introduction to Cybercrime - Classification of Cyber-crimes – Cyber-crime against women and children – Financial frauds - Social engineering attacks – Malware - Zero day and zero click attacks.

UNIT III

6 Hrs

Cyber Law: Cyber Criminals modus-operandi – Reporting of cybercrimes – remedial and mitigation measures – Legal perspective of cybercrime– IT Act 2000 and its amendments – Organization dealing with cybercrimes and cyber security in India.

UNIT IV

6 Hrs

Social Media Security: Introduction to social network – Types of social media – Social media platform – Hashtag – Viral content – Security issues related to social media. – **Cyber Security tools:** N map – Introduction to Nmap – Nmap scan types- Nmap command list. **Digital Transaction:** Introduction to digital payments – Components of digital payments – Modes of digital payments – Banking cards – UPI (Unified Payment Interface) – e-Wallets.

UNIT V

6 Hrs

Digital Devices Security: End point device and Mobile phone security – Password policy – Security patch management – Data backup – Device security policy – Cyber security best practices. Installation and configuration of Computer Anti-Virus. **Case studies:** Illustrations of Financial frauds – Digital Signature. Prepare a checklist for secure net banking.

*e-Content will be provided.

*This course is for all final year students of all streams from 2023-24 onwards.

REFERENCE BOOKS

1. Raef Meeuwisse, Cybersecurity for Beginners, Lulu Publishing Services, 2nd Edition, 2017
2. Scott Augenbaum, The Secret to Cybersecurity—A Simple Plan to Protect Your Family and Business from Cybercrime, Forefront Books Publisher, 2019
3. Sunit Belapure and Nina Godbole, Cyber security understanding cybercrimes computer forensics and Legal perspectives, Wiley India Pvt Ltd, 2011
4. Christopher Hadnagy, Social Engineering: The Science of Human Hacking, Wiley Publisher, 2nd Edition, 2018
5. Pavan Duggal, Artificial Intelligence, Cybercrimes & Cyberlaw, 2018
6. Joe Gray, Practical Social Engineering: A Primer for the Ethical Hacker, 2022
7. Security in the digital age: social media security threats and vulnerabilities by Henry A. Oliver, Create Space Independent publishing platform.

EVALUATION PATTERN

QUIZ	60 MARKS
CASE STUDY	20 MARKS
POSTER	20 MARKS

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23C13	CLOUD COMPUTING	Theory	73	2	-	4

Preamble

- To Identify the technical foundations of cloud systems architectures.
- To Apply principles of best practice in cloud application design and management.
- To Identify and define technical challenges for cloud applications and assess their importance
- To introduce the broad perceptive of cloud model and design of cloud services.
- To understand the concept of cloud virtualization and different cloud programming models.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify and define technical challenges for cloud applications and assess their importance.	K1
CLO2	Understand the importance of cloud computing and what is the process of cloud Computing.	K2
CLO3	Experiment various cloud programming models and apply to solve problems on the cloud.	K3
CLO4	Apply fundamental concepts in cloud infrastructures to manage data centers to build cloud applications that are elastic and cost-efficient.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

CLOUD COMPUTING - AP23C13 (73 HRS)

UNIT I:

(14 Hrs)

First Drive: Introduction-Essentials-Benefits-Why cloud?-Business and IT perspective-cloud and Virtualization-cloud Services Requirements-cloud and Dynamic Infrastructure-cloud Computing Characteristics-cloud Adoption. cloud Models: Introduction-cloud Characteristics-Measured Service-cloud Models-Security in a Public cloud-Public Vs. Private clouds-cloud Infrastructure Self Service.

UNIT II:

(15 Hrs)

Cloud as a Service: Introduction-Gamut of cloud Solutions-Principal Technologies- cloud Strategy-cloud Design and Implementation Using SOA- Conceptual cloud Model-cloud Service Defined. cloud Solutions: Introduction-cloud Business Process Management-cloud Service Management-cloud Stack-Computing on Demand (CoD) - cloud sourcing.

UNIT III:

(14 Hrs)

Cloud Offerings: Introduction-Information Storage, Retrieval, Archive and Protection- cloud Analytics-Testing under cloud-Information Security-Virtual desktop Infrastructure- Storage cloud. cloud Management: cloud Governance-High Availability and Disaster Recovery.

UNIT IV:**(15 Hrs)**

Cloud Virtualization Technology: Introduction-Virtualization Defined-Virtualization Benefits-Server Virtualization-Virtualization for x86 Architecture-Hypervisor Management Software-Logical Partitioning (LPAR)-VIO Server-Virtual Infrastructure Requirements. Deep Dive: cloud Virtualization-Introduction-cloud Server Virtualization.

UNIT V:**(15 Hrs)**

Cloud and SOA: Introduction-SOA journey to infrastructure-SOA and cloud-SOA defined-SOA and IAAS-SOA based cloud Infrastructure Steps-SOA Business and IT Services. cloud Infrastructure Benchmarking: Introduction-OLTP Benchmark-Business Intelligence Benchmark-e-Business Benchmark-ISV Benchmarks - cloud Performance Data Collection and Performance Monitoring Commands-Benchmark Tools.

Text Book

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Dr.KumarSaurabh	Cloud Computing Insights into New-Era Infrastructure	Wiley India Pvt.Ltd	2011,Reprint

Books for Reference

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR AND EDITION
1	Anthony T.Velte, TobyJ.Velte, RobertElsenpeter	Cloud Computing – A Practical Approach	Tata McGraw-Hill	2017,Reprint
2	Michael Miller	Cloud Computing	Pearson Education	2012, 2 nd edn.
3	A.Srinivasan, J.Suresh	Cloud Computing – A Practical Approach for Learning and Implementation	Pearson Education	2014, 1 st edn.
4	Nick Antonopoulos	Cloud Computing	Springer Publications	2017 ,2 nd edn.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23C14	WEB TECHNOLOGY	Theory	73	2	-	3

Preamble

- This course gives the basic principle, strategies and methodologies of web application development.
- The Course is designed to develop dynamic web page using scripting languages and various styles with CSS and HTML5 where scripting codes are embedded into HTML document for interactive presentation effect.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the basics of HTML, XML, CSS, Scripting language.	K1
CLO2	Understand the various designing concept for dynamic presentation effect in HTML and XML documents.	K2
CLO3	Apply the mark-up languages and Scripting languages for processing, identifying and presenting information in web pages.	K3
CLO4	Analyze scripting languages and mark-up language to add interactive components to web pages.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

WEB TECHNOLOGY -AP23C14 (73 HRS)

UNIT I: (14 Hrs)

Fundamentals of HTML:-Understanding Elements: Root Elements-Metadata Elements- Section Elements-Heading Elements. Describing data types.

UNIT II: (15 Hrs)

HTML5 and its essentials-Exploring New Features of HTML5-Next Generation of Web Development-Structuring an HTML Document-Exploring Editors and Browsers Supported by HTML5-Creating and Saving an HTML Document-Validating an HTML Document-Viewing an HTML Document-Hosting Web Pages.

UNIT III: (14 Hrs)

DHTML: Introduction - Cascading Style sheets - DHTML Document Object Model and collections – Event Handling - Filters and Transitions - Data Binding.

UNIT IV:**(15 Hrs)**

JAVASCRIPT: Introduction- Language Elements - Objects of JavaScript- Other Objects.
 VBSCRIPT: Introduction- Embedding VBScript Code in an HTML Document- Comments- Variables- Operators-Procedures- Conditional Statements- Looping Constructs - Objects and VBScript - Cookies.

UNIT V:**(15 Hrs)**

EXTENSIBLE MARK-UP LANGUAGE (XML): Introduction- HTML vs. XML- Syntax of the XML Document- XML Attributes- XML Validation- XML DTD- The Building Blocks of XML Documents-DTD Elements - DTD Attributes- DTD Entities- DTD Validation –XSL - XSL Transformation- XML Namespaces- XML Schema.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	N.P.Gopalan, J.Akilandeswari	Web Technology A Developer's- Perspective (Unit III, IV, V)	PHI Learning Pvt.Ltd	2011,4 th edn.
2	Kogent Learning Solutions Inc	HTML5 BlackBook (I, II)	Dreamtech Press	2011,2 nd edn.

Books for Reference

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Akanksha Rastogi	Web Technology	K.Nath & Co Educational Publishers	2012, 1 st edn.
2	Anuranjan Misra, Arjun Kumar Singh	Introduction to Web Technology	Laxmi Publication	2011, 1 st edn.
3	C.Xavier	World Wide Web Design with HTML	TMH Publishers	2017, Reprint

Pedagogy:

- PPT, Black board, Discussion, Interactive Teaching, Self-questioning by students, Group discussion, Quiz

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23E03	DIGITAL IMAGE PROCESSING	Theory	73	2	-	4

Preamble

- This course deals with enhancing, analyzing, and interpreting images using digital techniques.
- This course covers the fundamentals of image acquisition, sampling filtering, histogram processing, edge detection, color models, compression, morphological operations, and segmentation, preparing students to apply image processing in real-world applications like medical imaging and computer vision.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts, techniques, and applications of digital image processing.	K1
CLO2	Understand the principles and techniques used in digital image processing.	K2
CLO3	Apply various image processing techniques for enhancement and analysis.	K3
CLO4	Analyze image processing methods for feature extraction and object recognition.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DIGITAL IMAGE PROCESSING-AP23E03 (73 HRS)

UNIT I:

(14 Hrs)

Introduction- Origin of Digital Image Processing, Applications of Digital Image Processing, Fundamental Steps of Digital Image Processing. Components of an Image Processing System. Elements of Visual Perception, Light and Electromagnetic Spectrum, Image Sensing and Acquisition.

UNIT II:

(15 Hrs)

Image Sampling and Quantization, Basic concepts in Sampling and Quantization, Representing Digital Images, Image Interpolation, Some Basic Relationships Between Pixels, Neighbors of a Pixel, Adjacency, Connectivity, Regions, and Boundaries, Distance Measures, Intensity Transformation and Spatial Filtering, The Basics of Intensity Transformations and Spatial Filtering, Basic Intensity Transformation Functions, Image Negatives, Log Transformations, Piecewise-Linear Transformation Functions

UNIT III:**(15 Hrs)**

Histogram Processing, Histogram Equalization , Histogram Matching, Fundamentals of Spatial Filtering, The Mechanics of Spatial Filtering, Spatial Correlation and Convolution, Smoothing (Lowpass) Spatial Filters, Smoothing Linear Filters, Order-Statistic (Nonlinear) Filters), Sharpening (Highpass) Spatial Filters. Foundation, Edge detection: Sobel, Prewitt, Canny.

UNIT IV:**(14 Hrs)**

Filtering in the frequency domain: Background, Preliminary Concepts. Color Image Processing. Color fundamentals, Color Models: RGB, CMY, CMYK, HSI color model. Image Compression: Fundamentals, Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information.

UNIT V:**(15 Hrs)**

Morphological Image Processing : Preliminaries, Erosion, Dialation, Opening and Closing operations. The Hit and Miss Transformation. Basic Morphological Algorithm: Boundary Extraction, Hole Filling, Connected Components, Thinning, Thickening. Image Segmentation: Thresholding: Foundation, Basic Global Thresholding. Region-Based Segmentation.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	R. C. Gonzalez and R. E. Woods	Digital Image Processing	Hoboken, NJ, USA: Pearson	2018, 4 th edn.

Books for Reference

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	M. Sonka, V. Hlavac, and R. Boyle	Image Processing, Analysis, and Machine Vision	Boston, MA, USA: Cengage Learning	2015, 4 th edn.
2	S. E. Umbaugh	Digital Image Processing and Analysis: Computer Vision and Image Analysis	Boca Raton, FL, USA: CRC Press	2023, 4 th edn.

Course Designers

1. Dr.K.Geethalakshmi,
2. Dr. R.Hepziba Gnanamalar

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23E04	BLOCKCHAIN TECHNOLOGY	Theory	73	2	-	4

Preamble

- To introduce the fundamental concepts, architecture, and operational principles of blockchain technology.
- To emphasize a strong foundation in distributed ledger technology, cryptographic techniques, consensus mechanisms, and blockchain platforms such as Bitcoin and Ethereum.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals, characteristics, and history of Blockchain technology.	K1
CLO2	Describe Ethereum architecture, virtual machine, and development tools.	K2
CLO3	Apply hashing techniques and secure hash algorithms in blockchain mining.	K3
CLO4	Analyze the integration of blockchain with emerging technologies such as AI, IoT, and cloud computing.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

BLOCK CHAIN TECHNOLOGY-AP23E04

(73 HRS)

UNIT I:

(15 Hrs)

Basics of Blockchain-Introduction-Concept of Blockchain-History-Definition of Blockchain-Fundamentals of Blockchain-Characteristics of Blockchain- Consensus inTrust-Building Exercise-Public, Private,Private,and Hybrid Blockchains-Distributed Ledger Technologies.DCT Decentralized Applications and Databases-Architecture of Blockchain-Transactions-Chaining Blocks - Value Proposition of Blockchain Technology-Decentralized System- Introduction - Distributed Decentralized Databases-Decentralized Enterprise-Decentralization - Decentralized Enterprise Regulation.

UNIT II:**(14 Hrs)**

HASH Functions- Introduction-Hashing-Message Authentication Code - Secure Hash Algorithms (SHA-1)-Secure Hash Algorithm Version 3-Distributed Hash Tables - Hashing and Data Structures - Hashing in Blockchain Mining. Consensus-Introduction- Consensus Approach-Consensus Algorithms- Byzantine A freemen's Methods.

UNIT III:**(15 Hrs)**

Blockchain Components- Introduction-Ethereum-History-Virtual Machine-Working of ethereum-Ethereum Addresses-Ethereum Wallets- Ethereum Transactions-Ethereum Languages-Ethereum Development Tools. Cryptography-Introduction-Cryptography-Cryptography Primitives -Symmetric Cryptography-Asymmetric Cryptography.

UNIT IV:**(14 Hrs)**

Blockchain Vertical Solutions and Use Cases-Blockchain-Blockchain in Insurance-Life Insurance and Claim Processing in Case of Death-Healthcare-Assets Management-Financial Institutional Assets - Smart Assets-Electronic Currency-Manufacturing.

UNIT V:**(15 Hrs)**

Bitcoins-Introduction-Working of Bitcoin-Merkle Trees- Bitcoin Block Structure-Bitcoin Address-Bitcoin Transactions-Bitcoin Network- Bitcoin Wallets-Bitcoin Payments-Bitcoin Clients-Bitcoin Supply. Blockchain and Allied Technology-Blockchain and Cloud Computing-Characteristics of Blockchain Cloud- Blockchain and Artificial Intelligence- Blockchain and IoT - Blockchain and Machine Learning-Blockchain and Robotic Process Automation.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Kumar Saurabh, Ashutosh Saxena	Block Chain Technology - Concepts and Applications	Wiley Emerging Technology Series	2020,1 st edn.

Books for Reference

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda	Beginning Blockchain	Apress	2021,2 nd edn.
2	Sonali Vyas, Vinod Kumar Shukla, Shaurya Gupta and Ajay Prasad	Blockchain Technology Exploring opportunities, Challenges,and Applications	CRC Press, Taylor & Francis Group	2022,1 st edn.
3	Stephen Ashurst, Stefano / Tempesta	Blockchain Applied Practical Technology and Use Cases of Enterprise Blockchain for the Real World	Special Indian Edition	2022,,1 st edn.

Course Designers

1. Mrs.G.Dhivya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP23CP6	WEB TECHNOLOGY PROGRAMMING LAB	Practical	-	-	75	3

Preamble

- Experience to the learners in HTML programming based on concept learned with program course.
- Implementation of HTML commands and Cascading Style Sheets

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Defining the operators to learn the basic HTML commands	K1
CLO2	Summarizing the use of HTML, DHTML and Cascading Styles sheets	K2
CLO3	Applying client side programming for developing web pages	K3
CLO4	Develop a web page using XML.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

WEB TECHNOLOGY PROGRAMMING LAB - AP23CP6

(75 hours)

LIST OF PROGRAMS:

- Implementing Background design, Color & Text Tags.
- Implementing Image Tags.
- To display list of items in different styles.
- Implementing Table Tags.
- Demonstrate the usage of inline, internal and external style sheet using CSS.
- Implementing Java Script in HTML
- Hot Text using Hyperlink Tags.
- Implementing Frames and Frame sets.
- Create a form with various fields and appropriate front and validations using any one of the scripting languages.

- Demonstrate JavaScript with POP-UP boxes.
- Create a web page using XML.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs. R. Jayasree
2. Dr. L. Sheeba

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP21SBP3	DATA ANALYTICS –DATA VISUALIZATION TOOLS	Practical	-	4	41	3

Preamble

- This course is aimed for providing graphical representation for real time data using visualization tools.
- It facilitates the students to gain skills on geo spatial data visualization and to create dashboard.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Design bar chart and pie chart for real time data	K2
CLO2	Choose the right visualization tool for different data source	K2
CLO3	Develop geo map and symbol map for geospatial data	K3
CLO4	Construct dashboard for business data presentation and for decision making	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DATA ANALYTICS –DATA VISUALIZATION TOOLS - AP21SBP3

(41 Hours)

List of Programs

Exercises to be performed using data visualization tool.

1. Create a bar chart for the given data.
2. Create a pie chart for the given data.
3. Create a scatter chart for the given data.
4. Create a time series chart for the given data.
5. Create a bullet chart for the given data.
6. Create a area chart for the given data.
7. Create a heat map for the given data.
8. Create a geo map for the given data.
9. Create a filled map for the given data.
10. Create a dashboard and format it.

- **Pedagogy**

- Demonstration of working environment / Tools / Software / Program

- **Course Designers:**

1. Mrs. T.S.Anushya Devi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN21AC3	ARTIFICIAL INTELLIGENCE	Theory	-	-	-	5

Preamble

- To understand intelligent behavior, learning, and adaptation in machines, intended to assess the applicability, basic knowledge representation, problem solving and learning methods.

ARTIFICIAL INTELLIGENCE- IN21AC3

UNIT I:

Artificial intelligence meaning- The AI problems – The underlying assumption – What is an AI Techniques? – The level of the model. Problems, problem spaces, and search: Defining the system – problem characteristics – production system characteristics.

UNIT II:

Heuristic Search techniques: Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis.

Knowledge representation issues: Representations and mappings – Approaches to knowledge representation.

UNIT III:

Using predicate logic: Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction.

Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning – Matching – Control Knowledge.

UNIT IV:

Game playing: Overview – The minimax search procedure – Adding alpha – beta cutoffs – Additional refinements – Iterative Deepening – References on specific games.

Understanding: What is understanding? What makes understanding hard? Planning- The blocks world- components of a planning system –Good stack planning-Coral Stack planning- Non linear planning using constraint posting.

UNIT V:

Expert systems: Representing & using domain knowledge – Expert system shells – Knowledge acquisition.

Perception and Action: Real-time search – perception- Action – Robot Architectures.

Prolog- the National languages of Artificial intelligence- introduction- converting English to prolog facts and rules-Goals-prologue terminology-Variables-Control structure-Arithmetic Operators-Matching in prolog - Backtracking.

Text Book

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Elaine rich, Kevin Knight, Shivashankar B Nair	Artificial Intelligence	Tata McGraw Hill publication	2017,3 rd edn.

Books for Reference

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Mishra R.B	Artificial Intelligence	Prentice Hall of India	2010,1 st edn
2	Deepak Khemani	A Frist Course in Artificial Intelligence	Mc-Graw Hill Educaion Pvt. Ltd.	2013,1 st edn
3	Stuart Russell	Artificial Intelligence: A Modern Approach	Pearson	2013,3 rd edn.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AP16AC4	INTERNET OF THINGS	Theory	-	-	-	5

Preamble

- To understanding the fundamentals of Internet of Things and to build a small low cost embedded system using Raspberry Pi or equivalent boards
- To apply the concept of Internet of Things in the real world scenario

INTERNET OF THINGS (IOT) – AP16AC4

UNIT I:

Introduction & Concepts: Introduction to Internet of things- Definition & Characteristics of IoT- Physical Design of IoT- Logical design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.

UNIT II:

Domain Specific IOTs: Introduction – Home Automation – Cities – Logistics – Agriculture – Industry – Health & Lifestyle. IoT and M2M - IoT systems management with NETCONF-YANG

UNIT III:

IoT Platforms Design Methodology: Introduction – IoT Design Methodology – Case Study – IoT physical Devices & Endpoints: What is an IoT Device – Raspberry Pi Interfaces – Other IoT Devices.

UNIT IV:

IoT Physical Servers & cloud Offerings: Introduction – WAMP – Xively cloud for IoT – Designing a RESTful Web API – Web Services for IoT – IoT Messaging Platform.

UNIT V:

CASE STUDIES and ADVANCED TOPICS: Case Studies Illustrating IoT Design - Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce – Using Apache Storm for Real Time Data Analysis– Tools for IoT.

Text Book

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	ArshdeepBahga, Vijay Madiseti	Internet of Things – A hands-on approach	Universities Press.	2015,1 st edn.

Books for Reference

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR AND EDITION
1	Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers	Apress Publications	2014,1 st edn.
2	Francis da Costa	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	Apress Publications	2013,1 st edn.
3	Marco Schwartz	Internet of Things with the Arduino Yun	Packt Publishing	2014,1 st edn.