DEPARTMENT OF INFORMATION TECHNOLOGY

CHOICE BASED CREDIT SYSTEM
&
LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

BACHELOR OF INFORMATION TECHNOLOGY

2023-2026 BATCH

PSGR
Krishnammal College for Women **KCW**

Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

PROGRAMME LEARNING OUTCOMES (PLO's)

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

PLO1: Design, implement, and evaluate a computing-based solution to meet the industry standards.

PLO2: Apply computing theory and programming principles to real-time software design and development.

PLO3: Explore Current and emerging techniques and technologies to formulate solutions for systems and organizations.

PLO4: Pursue higher studies in the specialized area and also promote life-long learning for professional development.

PLO5: Recognize as world class professionals in IT and produce women entrepreneurs to increasemore employability.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

The students at the time of graduation will

PSO1: Professionally be equipped in the areas of programming, Cloud Infrastructure, Internet of Things, Mobile Application Development and to be ease with the recent technologies of various domains.

PSO2: Apply the knowledge of technology and soft skills to carry out societal software development.

PSO3: Analyze modern computer languages and applications for their successful Career, to create platforms to become an entrepreneur and a relish for higher studies.

PSGR Krishnammal College for Women KCW CELEBRATING WOMEN SINCE 1963

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Department of Information Technology
Choice Based Credit System & Learning Outcomes Based Curriculum Framework
Bachelor of Information Technology - 2023 -2026 Batch

Semester	Part	Subject Code	Title of Paper	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									A C	ESE	Total	
I	I	TAM2301A/ HIN2301A/ FRE2301A	Language I	Language	4	58	2	3	25	75	100	3
I	II	ENG2301A	English Paper I	English	4	58	2	3	25	75	100	3
I	III	IN23C01	Core 1: Computer Programming	CC	4	58	2	3	25	75	100	3
I	III	PP22C02	Core 2: Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100#	-	100	3
I	III	AP23C03	Core 3: Operating Systems Fundamentals - Linux	CC	4	58	2	3	25	75	100	3
I	III	IN23CP1	**Lab1:**Computer Programming Lab	CC	3	45	-	3	15	35	50	2
I	III	TH23A03	Allied A1:Numerical and Statistical Techniques	GE	6	88	2	3	25	75	100	5
I	IV	NME23ES NME23A1/ NME23B1	Introduction to Entrepreneurship Advance Tamil/ Basic Tamil	AEC	2	30 / 28	- / 2	- / 2	100	-	100	2
II	I	TAM2302A/ HIN2302A/ FRE2302A	Language II	Language	4	58	2	3		75	100	3
II	II	ENG2302A	English Paper II	English	4	58	2	3		75	100	3
II	III	IN23C04	Core 4: Computer Programming-II	CC	5	73	2	3	5	75	100	3

Sem	Part	Course Code	Course Title	Category	Credits	Hours			CIA	ESE	Total	Grade
II	III	IN23C05	Core 5: Data Structure and Algorithm	CC	4	58	2	3		75	100	3
II	III	IN23CP2	**Lab2:**Computer Programming II Lab	CC	5	75	-	3	5*	35*	50	3
II	III	TH23A06	**Allied A2:**Discrete Mathematics	GE	6	88	2	3	5	75	100	5
II	IV		Open Course: (Selfstudy - Online Course)	AEC	-	-	-	-	-	-	-	Grade
II		NME23A2 / NME23B2	**Advance Tamil-II/Basic Tamil-II	AEC	2	-	-	-	100	-	100	Grade
II	V	23PEPS1	Professional English for Physical Sciences	AEC	2	25	5	-	100	-	100	2
II	VI	NM23GAW	General Awareness	AEC	Self Study	-	-	OT	100	-	100	Grade
II	IV		Job Oriented Course: Amazon Web Services/Cisco Certified network Associate/Microsoft Windows Server Administration/Microsoft Power BI	-	-	-	-	-	-	-	-	Grade
III	I	TAM2303A/ HIN2303A/ FRE2303A	Language III-Tamil Paper III/ Hindi Paper III/ French Paper III	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	IN23C06	**Core 6:** Database Management System	CC	4	58	2	3	25	75	100	3
III	III	IN23C07	**Core 7:** Digital Logic and circuits	CC	4	58	2	3	25	75	100	3
III/IV	III	IN23SCE1/ CS23SBGP	**Coursera:** R Programming/**SBS I-**Gen-AI	SEC	3	45/44	-/1	-	100	-	100	3
III	III	TH23A13	**Allied3**: Optimization Techniques	GE	4	58	2	3	25	75	100	3

Sem	Part	Course Code	Course Title	Category								
III	III	IN23CP3	**Lab 3**: DBMS lab	CC	5	75	-	3	15*	35*	50*	3
III	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
III	IV	NM22UHR	Universal Human Values and Human Rights#	AECC	-	-	-	-	100	-	100	Grade
I-V	VI	16BONL1 16BONL2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-
IV	I	TAM2304A/ HIN2304A/ FRE2304A	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	L	4	58	2	3	25	75	100	3
IV	II	ENG2304A	English Paper IV	E	4	58	2	3	25	75	100	3
IV	III	IN23C08	Computer Networks	CC	4	58	2	3	25	75	100	3
	III	IN23C09	Augmented Reality/ Virtual Reality	CC	4	58	2	3	25	75	100	3
	III	IN23CP4	Computer Networks Lab	CC	5	75	-	3	15*	35*	50*	3
	III	BP23A05 AP23A01 CS23A02	Business Accounting Digital Marketing M-Commerce	GE	4	58	2	3	25	75	100	3
III-IV	III	CS23SBGP/ IN23SCE1	**Gen AI/** **Coursera:** R Programming	SEC	3	45	-	-	100	-	100	3
	IV	NM23EII	Entrepreneurship and Innovation (IgniteX)	AECC	2	30	-	-	100	-	100	2
I-IV	VI	COM15SER	Community Service 30 Hrs	GC	-	-	-	-	-	-	-	-

Sem	Part	Course Code	Course Title	Category							Total	
	IV	NM23EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr.
	V	COCOACT	Co-Curricular Activities	GC	-	-	-	-	100	-	100	1
V	III	AI23C10	Machine Learning	CC	5	73	2	3	25	75	100	4
V	III	IN23C11	Internet of Things	CC	5	73	2	3	25	75	100	4
V	III	IN23C12	Software Engineering and Testing	CC	5	73	2	3	25	75	100	4
V	III	IN23E01	Cloud Computing	DSE	5	73	2	3	25	75	100	5
		IN23E02	Wireless Sensor Networks									
		IN23E03	Computer Graphics and Multimedia									
V	III	IN23CP5	IoT Lab	CC	5	75	-	3	15*	35*	50	3
V	III	IN23SBP1	Data Visualization Tools Lab	SEC	3	41	4	-	100	-	100	3
V	III	IN23AC1	Data Mining	ACC	SS	-	-	3	25	75	100	5**
		IN23AC2	Bio-Inspired Computing									
V	IV	NM21CS1	Cyber Security I	AECC	2	30	-	-	100	-	100	Gr.
V	IV	IN23INST	Field work/ Institutional Training	DSE	-	-	-	-	100	-	100	2

									CA	ESE	Total	
V	VI	IN23COM	Comprehensive Examination	GC	-	-	-	-	100	-	100	Gr.
I-IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I-V	VI	16BONL1 16BONL2	Online Course Online Course	ACC	-	-	-	-	-	-	-	-
VI	III	IN23C13	Full Stack Development	CC	5	73	2	3	25	75	100	4
VI	III	IN23C14	Artificial Intelligence of Things	CC	5	73	2	3	25	75	100	4
VI	III	IN23E04 IN23E05	Natural Language Processing BlockChain Technology	CC	5	73	2	3	25	75	100	4
VI	III	IN23CP6	Full Stack Development Lab	CC	5	75	-	3	15#	35#	50	2
VI	III	IN23PROJ	Project and Viva-Voce	DSE	7	105	-	-	25	75	100	5
VI	III	IN23SBP2	Software Testing Tools	SEC	3	41	4	-	100	-	100	3
VI	III	IN22AC3 IN23AC4	Robotic Process Automation Big Data Analytics	ACC	SS	-	-	3	25	75	100	5*
I-V	VI	16BONL1 16BONL2	Online Course Online Course	ACC	-	-	-	-	-	-	-	-

#CA conducted for 25 marks converted to 15, ESE conducted for 75 and converted to 35
*The credit is applicable to a candidate who takes up the advanced learner course exam.

CC: Core Courses   CA: Continuous Assessment

GE: Generic Elective   ESE: End Semester Examination

DSE: Discipline Specific Elective

AEC: Ability Enhancement Course   SEC: Skill Enhancement Course

AECC: Ability Enhancement Compulsory Courses

ACC: Additional Credit Course

#: Self Study

Question Paper Pattern

2023-24 Batch:

CA Question Paper Pattern and distribution of marks UG

Language and English
Section A 5 x 1 (No choice) : 5 Marks

Section B 4 x 5 (4 out of 6) : 20 Marks (250 words)

Section C 2 x 10 (2 out of 3) : 20 Marks (500

words) Total : 45 Marks

UG Core and Allied - (First 3 Units)
CA Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level):

5 x 3 = One question with a weightage of 8 Marks (Internal Choice at the same CLO

level) :8 x 3 = Total :45 Marks

ALC
Section A (Paragraph answer) (4 out of 6) 4 x 4 : 16 Marks

Section B (Essay type) 1 out of 2 : 9 Marks

Total : 25 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English – UG
Section A 10 x 1 (10 out of 12) : 10 Marks

Section B 5 x 5 (5 out of 7) : 25 Marks (250 words)

Section A 4 x 10 (4 out of 6) : 40 Marks (600 - 700 words)

Total : 75 Marks

UG - Core and Allied courses:
ESE Question Paper Pattern: 5 x 15 = 75 Marks

Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 5=10

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5 =25

One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5 =40

End Semester for UG / PG - Advance Learner Courses

Section A 5 questions out of 8 - open choice 5x5 :25 marks

Section B 5 questions out of 8-open choice 5x10 :50 marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Project:

Evaluation of Individual / Group Project & Viva Voce for UG & PG

I Review - Selection of the field of study, : 5 Marks

Topic &literature collection

II Review - Research Design : 10 Marks

&Data Collection

III Review – Analysis & Conclusion : 10 Marks

Preparation of rough draft

Total : 25 Marks

End semester examination:

Evaluation of the project : 25 Marks

Viva Voce : 50 Marks

Total : 75 Marks

Total : 25 marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

IN23C01

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

PP22C02

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

IN23CP1

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

AP23C03

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

IN23C04

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

IN23C05

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	S	S

CLO2	S	M	S	M	M
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S
IN23CP2					
CLO1	S	S	M	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	M	S	S
IN23C06					
CLO1	M	S	M	S	M
CLO2	S	M	M	S	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S
IN23C07					
CLO1	S	S	M	M	S
CLO2	M	M	S	S	M
CLO3	S	S	S	M	S
CLO4	M	S	S	M	M
IN23CP3					
CLO1	M	M	S	S	M
CO2	S	M	S	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

IN23C08					
CLO1	M	M	S	S	S
CLO2	M	M	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S
IN23C09					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	M	S	S	S	S
CLO4	S	S	M	S	M
IN22CP4					
CLO1	M	M	S	S	S
CLO2	M	M	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S
AP23A01					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S
CS23A02					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M

CLO3	S	S	S	S	M
CLO4	S	S	S	M	S
AI23C10					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
IN23C11					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
IN23C12					
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
IN23E01					
CLO1	M	S	M	M	M
CLO2	S	M	S	S	S
CLO3	M	S	S	M	M
CLO4	S	S	M	S	S
IN23E02					

CLO1	S	M	S	S	S
CLO2	M	S	S	M	S
CLO3	S	M	M	S	M
CLO4	M	S	S	M	S
IN23E03					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	M	S	S	S	S
CLO4	S	S	M	S	M
IN23CP5					
CLO1	S	S	M	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	M	S
CLO4	S	S	S	S	S
IN23SBP1					
CLO1	S	M	M	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S
IN23C13					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	M	S	M	M	M

CLO4	M	S	S	S	S
IN23C14					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
IN23E04					
CLO1	M	S	M	M	M
CLO2	S	M	S	S	M
CLO3	M	S	S	M	S
CLO4	S	S	M	S	S
IN23E05					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	M	S	S	S
CLO4	S	S	S	S	S
IN23CP6					
CLO1	S	S	M	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	M	S
CLO4	S	S	S	S	S
IN23SBP2					
CLO1	S	M	S	M	M

CLO2	S	S	M	M	M
CLO3	M	S	S	S	S
CLO4	S	M	M	S	S

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 the program execution.	K1
CLO2	Understand the purpose of operations, strings, lists, tuples 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	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**

Syllabus

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- Exception &Tools: Exception Basics-Exception Coding Details.

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 - Impact of Industry 4.0 on Society, Business, Government and People - Introduction to 5.0.

Text Book

Sno	Author	Title of the Book	Publisher	Year of Publication
1	Mark Lutz	Learning python(Unit I-IV)	O'Reilly Publication	5th edition, 2013
2	P.Kaliraj , T.Devi	Higher Eduaction for Industry 4.0 and Transformation to Education 5.0(unit-V)	CRC Press Taylor and Francis Group	1st Edition 2021

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Mark Summerfield	Programming in python 3	Pearson Education	2009.
2	Mark Pilgrim	Dive into python 3	Apress publication	2011
3	Richard L. Halterman	Fundamentals of Python Programming	Southern Adventist University	2017

Pedagogy
- Lectures, Group discussions, Demonstrations

Course Designer

   Dr . R. Divya

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 the young minds to think like a computer scientist, 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	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	S
CLO2	S	S	S	M	S
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

45 Hrs

Syllabus

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: Flowgorithm 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

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
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. V. Deepa

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
IN23CP1	**COMPUTER PROGRAMMING LAB**	PRACTICAL	-	-	45	2

Preamble

The course gives hands-on experience on Python Programming and improves 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 Python code. The course involved in compiling, linking and debugging Python code and developing somecomplex 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 statement, looping statements and functions.	K1
CLO2	Develop programs with 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 Programme 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

PYTHON PROGRAMMING LAB- IN23CP1   **45 Hrs**

   Program List

- Exercise programs on basic control structures & loops.

- Exercise programs on operators & I/O operations.

- Exercise programs on Python Script.

- Exercise programs on Lists.

- Exercise programs on Strings.

- Exercise programs on functions.

- Exercise programs on recursion & parameter passing techniques.

- Exercise programs on Tuples.

- Exercise programs on file.

- Exercise programs on Exception handling concepts.

Pedagogy
- Demonstration of working environment/Tools/Software/Program

Course Designer
Dr. K. Sathyakumari

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 task on LINUX servers.

Course Learning Outcomes

CLOs Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts with functions of operating systems and Linux system.	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 hours)**

SYLLABUS

UNIT I   **(12 Hrs)**

Introduction: What is 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 Nonpreemptive Scheduling**-Scheduling Criteria-Scheduling Algorithms (FCFS, SJF & Round Robin only).

Synchronization: **Back ground**-The Critical Section Problem-Peterson's Solution- Semaphores-The DiningPhilosopher'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

S.no	Author	Title of book	Publisher	Year of publication
1	Abraham Silberschatz, Peter Baer Galvin, G Gagne	OPERATING SYSTEMS CONCEPTS	Wiley Publishers, 10th Edition	2018
2	ChristopherNegus	LINUX BIBLE	Wiley,10th Edition	2020

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
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	Createspace Independent Pub	2014

 Pedagogy

- Lecture, Group Discussion, Demonstrations

 Course Designer

 Mrs. G. Sangeetha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C04	**COMPUTER PROGRAMMING -II**	THEORY	73	2	-	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 concept and techniques 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.

COMPUTER PROGRAMMING-II - IN23C04 (73 Hrs)

Syllabus

Unit I 15 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 15 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 14 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   **14 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 (Unit I – V)	McGraw Hill Education	8th Edition, 2019

Reference Books

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

Pedagogy

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

Course Designer

Dr. S. Nithya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C05	DATA STRUCTURE AND ALGORITHM	THEORY	58	2	-	3

Preamble

To provide an overview of data structures and algorithm design methods for programming and problem-solving process.

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 concepts of Arrays, Stack, Queue, Link List, Trees and Graph.	K1
CLO2	Understand sorting, searching and hashing algorithm	K2
CLO3	Apply the data structures to solve various computing algorithms and sorting algorithms.	K3
CLO4	Analyze lists, queues, stacks, trees and graph according to the needs of different applications	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

DATA STRUCTURE AND ALGORITHM- IN23C05   58 Hrs

Syllabus

UNIT-I   12 Hrs

Introduction to Data Structure: Definition, Basic Terminology, Elementary Data Organization –

Types of Data Structures- Linear & Non-Linear Data Structures-Data Structure Operations. Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis). **Abstract Data Types-Advantages of ADT.** Array: Representation of arrays, Types of arrays, Applications of arrays, Sparse matrix and its representation**.**

UNIT-II   12 Hrs

Stacks and Queues: Stack-Stack Representation & Implementation-Stack Operations-**Applications of Stack.** Queue-Queue Representation & Implementation-Queue Operations-**Types of Queues**.

UNIT-III   11 Hrs

Linked List: Linked List as Data Structures- Representation of Linked List-Operations on Linked List-Stack as

Linked List-Queue as Linked List-**Doubly Linked List-Circular List.**

UNIT-IV   13 Hrs

Trees: Preliminaries-Binary Trees-**B-Trees**. Graph: Graph Terminologies-**Types of Graphs**-Graph Representation.

Hashing: Hash Functions. Sorting: Bubble Sort-Selection Sort-QuickSort-Heap Sort-Merge Sort.

UNIT-V   10 Hrs

Algorithm Design Techniques: Greedy Algorithms - Prim's Algorithm, Kruskal's Algorithm. **Divide and Conquer:**

Running Time of Divide and conquer algorithms. Decrease and Conquer- Depth First Search and Breadth First Search.

Backtracking Algorithms - n Queens Problem, **Branch and Bound – Traveling Salesman Problem.**

Text Books

S.No.	Authors	Title	Publishers	Year of Publication
1.	Rajesh K. Shukla	Data Structures using C & C++	Wiley India	2009
2.	Seymour Lipschutz, G A Vijayalakshmi Pai	Data Structures	Tata McGraw-Hill	2014

Reference Books

S.No.	Authors	Title	Publishers	Year of Publication
1.	Anany Levitin	Introduction to Design and Analysis of Algorithms	Pearson Education	2009
2.	Wisnu Anggoro	C++ Data Structures and Algorithms	Packt Publishing	2018
3.	YedidyahLangsam, Moshe J.Augentein, aron M.Tenenbaum	Data Structures using C & C++	PHI Learning, 2nd Edition	2009

Pedagogy
- Chalk & talk, PPT, Group Discussion, Assignment, Demo, Quiz, Role play.

Course Designer

    Dr. R. Jeevitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23CP2	COMPUTER PROGRAMMING LAB-II	PRACTICAL	-	-	75	3

Preamble

The course gives hands-on experience on C Programming and improves 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.The course involved in compiling, linking and debugging C code and developing some complex programs.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Outline the logic using flowchart for a given problem and develop programs using conditional and looping statements.	K1
CLO2	Develop programs with concepts of arrays, functions, string handling functions and parameter passing techniques.	K2
CLO3	Construct programs with features of Structure and Pointers.	K3
CLO4	Develop readable programs with files for reading input and storing the output with perform operations.	K4

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

COMPUTER PROGRAMMING LAB-II - IN23CP2   **75 Hrs**

Program List

- Exercise in basics Operations Statement.

- Exercise in Control Structures.

- Exercise in arrays.

- Exercise in String handling functions.

- Exercise in User defined functions.

- Exercise in Recursion function.

- Exercise in Structure.

- Exercise in Pointers.

- Exercise in file operations.

- Exercise in Command Line Arguments

- Exercise of stack implementation

- Exercise of implementing queue

- Exercise of implementing Linked List

Pedagogy
- Demonstration of working environment/Tools/Software/Program

Course Designers
Dr. S. Nithya

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

ComputeServices:-AmazonElasticComputeCloud(EC2)-AmazonElasticContainer Service (ECS) - Amazon Elastic Load Balancing (ELB) -Auto Scaling AmazonLightsail -AWS Lambda Storage Services: Amazon Simple Storage Service (S3) – AmazonElastic 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 Route53- Amazon Cloud Front- 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 Cloud HSM AWS Shield Management & Developer Tools- AWS Cloud Formation – AWS Cloud Trail-AWS Command Line Interface(CLI)-AWS Systems Manager-AWS Code Commit - AWS Code Build - AWS Code Deploy - AWS Code Pipeline Amazon Kinesis –Amazon EMR –Amazon Athena - Amazon Redshift-Amazon Quick Sight

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 – Cablings – 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

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 NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C06	**DATABASE MANAGEMENT SYSTEM**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course provides an insight on the basics of database, database design, relational model and querying a database. It also gives an overview of NoSQL databases and storing and accessing data in a key/value database MongoDB.

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 of database management and NoSQL Databases	K1
CLO2	Understand DDL, DML SQL statements and PL/SQL programming	K2
CLO3	Apply various queries, PL/SQL program to store and retrieve data from databases	K3
CLO4	Analyze the working of SQL, PL/SQL program, NoSQL database to solve real-world problems	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;.

DATABASE MANAGEMENT SYSTEMS – IN23C06 58 Hrs

Syllabus

Unit – I (12 Hrs)

Database Concepts: Introduction -Relationships - **DBMS** -Relational data model - Integrity rules - **Theoretical relational languages**. Database Design: Data modeling -**Dependency** -Database design - Normal forms - **Dependency diagrams – De normalization**.

Unit – II (12 Hrs)

Structured Query Language (SQL): Introduction – DDL - Naming rules and conventions – Data types – **Constraints** - Creating table- Displaying table information - **Altering an existing table**– **Dropping, renaming, and truncating table** - Table type. Working with tables: DML - adding a newrow/record – updating and deleting existing rows/records - Retrieving data from table.

Unit-III (12 Hrs)

Functions and Grouping: Built-in functions - Grouping data. Joins and Views: **Join -Join types.** Views: Views - **Creating a view - Removing a view** - **Altering a view**. PL/SQL: Fundamentals - Block structure - comments - Data types – Other data types - Variable declaration –

Assignment operation.

Unit – IV   **(12 Hrs)**
Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - **Transaction control statements**. PL/SQL Cursors: **Cursors -Implicit & explicit cursors and attributes** - cursor FOR loops - Records - Tables - **Procedures -Functions – Triggers**

Unit – V   **(10 Hrs)**
An overview of NoSQL - **Characteristics of NoSQL – NoSQL storage types** - Advantages and Drawbacks - Mongo DB Introduction – **Creating database and Dropping database** - **Creating collection and Dropping collection** – Insert, query and update document.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1.	Nilesh Shah	Database Systems UsingOracle	PHI	2016, 2nd Edition,
2.	Gaurav Vaish	Getting Started with NoSQL	Packt	2013,1 st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Rajesh Narang	Database Management Systems	Prentice Hall of India,	2011, 2nd Edition,
3	Kristina Chodorow	MongoDB: DefinitiveGuide	Oreilly	2015,2nd Edition,

Pedagogy
- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Flipped mode.

Course Designers
Dr. G.SANGEETHA

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C07	DIGITAL LOGIC AND CIRCUITS	THEORY	58	2	-	3

Preamble

To impart the knowledge on simulation of digital system and functionality of Combinationalcircuits Boolean Algebra and flip flops.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the principles of binary number system and basic logicgates.	K1
CLO2	Understand the operations on Boolean laws and Theorems and Karnaugh Map	K2
CLO3	Applying the basic principles and types of registers, counters and the functionality of Multiplexers and Flip Flops	K3
CLO4	Analyze the concept of Memory Addressing and programmable logic devices	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DIGITAL LOGIC AND CIRCUITS - IN23C07 (58Hrs)

Syllabus

UNIT I: (12 hrs)

Number Systems and Codes: Binary Number system – Binary to Decimal –Decimal to Binary – Hexa Decimal — Excess-3 Code – Gray code- **Error Detection and Correction. DIGITAL LOGIC:The Basic Gates – NOT, OR, AND - Universal Logic Gates – NOR, NAND.**

UNIT II: (12 hrs)

Combinational Circuits: Boolean Laws and Theorems - Sum of Products method – Truth table to Karnaugh Map –Don't Care Conditions- Product-of sums method -Product-of sums Simplifications.

UNIT III: (12 hrs)

Data Processing Circuits: Multiplexers – Demultiplexers- Encoders –Decoders. **Flip-Flops**-RS Flip-Flops - **Edge-triggered D Flip-flops--Edge-triggered JK Flip-Flops-JK Master Slave Flip- flops.**

UNIT IV: (11 hrs)

Types of Registers: Serial In-Serial Out – Serial In-Parallel Out – Parallel in Serial Out - Parallel In- Parallel Out – Universal Shift Register. **COUNTERS:** Ring Counter –Ripple

Counter – Asynchronous Counter - Synchronous Counter.

UNIT V: (11 hrs)

Memory: Magnetic Memory – optical memory – Memory Addressing – ROM – RAM – EPROM – PROM –**Sequential programmable logic devices – Content Addressable memory**.

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1	Donald P Leach, Albert Paul Malvino, Goutam Saha	Digital Principles and Applications	M cGraw-Hill Education,8th edition	2015, 7th Edition

Reference Books

S.No.	Authors	Title	Publishers	Year and Edition
1	R.Anantha Natarajan	Digital Design	PHI Learning	2015, 1 st Edition
2	K.Meena	Principles of Digital Electronics	PHI Learning	2013, 1 st Edition

Pedagogy

Chalk & talk PPT, Group Discussion, Assignment, Demo, Quiz, Role play.

Course Designer
Dr .K. Sathyakumari

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23SCE1	**Coursera: R PROGRAMMING**	**Theory**	**45**	**-**	**-**	**3**

Coursera – R PROGRAMMING

Course Contents   **45 Hrs**

- Background, Getting started, and Nuts and Bolts-(13 hours)

- Programming with R (12 hours)

- Loop functions and debugging. (9 hours)

- Simulation and Profiling. (11 hours)

Course Number	Course Name	Category	L	T	P	Credit
CS23SBGP	SBS I - Gen-AI	Theory	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

CLO 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

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	S	S	M
CO2	S	M	S	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium.

SBS I: Gen-AI - CS23SBGP (45 Hrs)

Unit 1: Introduction to Gen AI (9 hours)

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 2: Basic AI Concepts (8 hours)

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 3: AI in Practice **(9 hours)**

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 4: AI for Productivity and Creativity **(9 hours)**

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 5: Future of Gen AI and Final Project **(9 hours)**

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 Designer

Mrs. S. Ponmalar

Evaluation pattern for Gen-AI

Quiz   : 50 Marks (5 quizzes with each 10 marks)
Case study   : 25 Marks
Online Exam   : 25 Marks (Departments to plan and conduct the exam)
Total   : **100 Marks**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23CP3	**DBMS LAB**	PRACTICAL	-	-	75	3

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 experience a NoSQL key.

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	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	S	S	M
CO2	S	M	S	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium.

DBMS LAB - IN23CP3   75 Hrs

Program List

- Different data types and operators.

- ER diagram with entities , attribute ,keys and relations.

- Integrity constraints

- Built-in functions and views.

- Create, insert, update and alter table.

- Implement PL/SQL Block.

- Control Structures and Embedded SQL

- Splitting and Joining the table

- PL/SQL Functions

- PL/SQL Procedure

- A case study and formulate the problem statement on a specify project.

Pedagogy

- Demonstration of working environment/Tools/Software/Program

Course Designers

Mrs. V. Deepa

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C08	Computer Networks	Theory	58	2	-	3

Preamble

The subject is intended to provide the student with the in-depth knowledge of Networks. It also shedslight around wide spread applications of the Internet.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Infer Fundamental concepts of Data communication, Transmission Media and Networking.	K1
CLO2	Understand data communication using the network topologies, layered model and internetworking.	K2
CLO3	Apply the networking concepts and communication protocol in real-time Applications,Virtual LAN Management	K3
CLO4	Analyze the principles of wireless and mobile networks	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Computer Networks - IN23C08 **(58 hours)**

Unit 1: **(12 hours)**

Introduction to Networks: Classifications of computer networks- - Modes of Data Transmission: **Simple, Half duplex, Full duplex communication -Topologies of Computer Networks -** The OSI Reference Model: Introduction to the OSI Reference Model - Seven Layers - Functions of OSI Reference Model- Protocols and Standards- Internetworking devices .

Unit 2 **(12 hours)**

Transmission Media: Guided Media- Unguided Media, - **Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.** Data Link Layer: Error Deduction and Correction-Sliding window protocol-Stop and wait protocol. LAN: Wired LAN, Wireless LAN, Virtual LAN : Managing VLAN and its benefits.

Unit 3 **(11 hours)**

Network Layer Services : **Switching: Circuit Switched Network-Packet -Switching**-Structure of a switch- **IP Addressing: The Purpose of IP addresses** - **The Hierarchy of IP Addresses**-Routing Algorithms – Static routing protocols-Routing Information Protocol- Open Shortest Path First Protocol .

Unit 4 **(11 hours)**

Transport Layer: Connection establishment, Connection release, The Internet Transport Protocols: UDP, TCP.

Application Layer: Providing services, Applications layer paradigms: DNS-Client server model, HTTP, **E-mail, WWW**, TELNET.

Unit 5   **(12 hours)**

Wireless and Mobile Networks: Wireless links, Characteristics-CDMA- Bluetooth - Architecture-Bluetooth layers. **Satellite Networks -Operation, GEO, MEO and LEO satellites.** Cellular Internet Access-Architecture, **Standards-3G,4G,5G**, Near Field Communication (NFC). Mobility - Principles, Addressing and routing to mobile users, Mobile IP, Handling mobility in Cellular Networks.

Text Book

S. No	Authors	Title	Publishers	Year and Edition
1.	Behrouz A. Forouzan	Data Communications and Networking	Tata McGraw-Hill PubCompany Ltd,	2017, 5th Edition,
2	SilviuAngeles cu	CCNA Certification All-in - One For Dummies	For Dummies	2010,1st Edition
3	Andrew S. Tanenbaum	Computer Networks	Prentice Hall of India,4th Edition	2012,1st Edition

Reference Books

S. No	Authors	Title	Publishers	Year and Edition
1.	Larry L Peterson, Bruce S Davie	Computer Networks - A systems approach	Elsevier Press	2012,5th Edition,
2	PrakashC.Gupta	Data Communication & Computer Networks	PHI Learning Pvt Ltd 2nd Edition	2014,1st Edition

Pedagogy

- Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz, Case study, ICT tools.

Course Designer
Mrs. V. DEEPA

Preamble

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C09	AUGMENTED REALITY/ VIRTUAL REALITY	THEORY	58	2	-	3

The objective of this course is to provide a detailed understanding of the concepts of Augmented / Virtual Reality and its applications.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	To Recall fundamental concepts of computer vision, computer graphicsand human-computer interaction techniques related to AR/VR.	K1
CLO2	To understand virtual environment and applications of AR and VR in real world.	K2
CLO3	To applyVarious tools in AR and VR Development	K3
CLO4	Analyze and Create an AR User Framework	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

AUGMENTED REALITY / VIRTUAL REALITY - IN23C09   58 Hrs

Syllabus

UNIT I **(12 Hrs)**
Augmented Reality: Taxonomy, Technology and features of augmented reality, **Difference between AR and VR**, Types Of AR, Challenges with AR, Advantages of AR, Ingredients of an Augmented Reality experience, **Visualization techniques for augmented reality**, Applying Augmented Reality to a problem.

UNIT II **(12 Hrs)**
Virtual Reality Environment: Introduction, The Three I's of VR**, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement**, Benefits of virtual reality, Historical development of VR. **3D Computer Graphics:** Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, **Realism-Stereographic image**.

UNIT III   (11 Hrs)

Applications of AR and VR: Applications of AR in education, science, business, manufacturing and medicine. **Application of VR in Film and TV Production**, Military VR applications, **VR Technology in Robotics and Games**.

UNIT IV   (12 Hrs)

Setting Up for AR Development - Getting started with Unity - Preparing your project for AR development - Setting up for mobile development - **Your First AR Scene -** Building the SimpleAR scene in your own project - Starting a new, basic AR scene.

UNIT V   (11 Hrs)

Creating an AR User Framework - Creating the UI canvas and panels - Creating the UI controller - Using the Unity onboarding UX assets - **Starting with the AR Framework -** Adding a main menu - Adding Place Object-mode with instructional UI scene template - Wiring the menu buttons - Advanced onboarding issues

Text Book

S.No	Author	Title of book	Publisher	Year and Edition
1	Jonathan Linowes	Augmented Reality with Unity AR Foundation	Packt Publishing Ltd.	2021,1st Edition
2.	Grigore C. Burdea, Philippe Coiffet	Virtual Reality Technology	Wiley	2016,1st Edition
3.	Alan B. Craig	Understanding Augmented reality, Concepts and applications	Morgan Kaufmann	2013,1st Edition

Reference Books

Pedagogy
Chalk and talk, PPT, Group Discussion, Assignment

S.No	Author	Title of book	Publisher	Year and Edition
1	John Vince	uction to VirtualReality	Springer	2004, 1st Edition
1.	Alan Craig, William Sherman and Jeffrey Will	Developing Virtual RealityApplications, Foundations of Effective Design	Morgan Kaufmann	2009,1st Edition

Course Designer
Dr.G.Sangeetha

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT

IN23CP4	Computer Networks Lab	Theory	-	-	75	3

Preamble

The subject is intended to provide the student with the in-depth knowledge of Networks This imparts a detailed knowledge on designing the structure and topology of different types of networks and various routing protocols.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Design the Fundamental concepts of Data communication, Transmission Media and Networking using network devices.	K1
CLO2	Understand by designing various types of network topologies and internetworking.	K2
CLO3	Apply the networking concepts and communication protocol in real-time Applications, Virtual LAN Management	K3
CLO4	Implement and configure different types of routing protocols , TCP,UDP.	K4

Mapping with Programme Learning Outcomes

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

Computer Network lab Syllabus -75 hrs

- Basic Switch and End Device Configuration
- Configure SSH, Router Interfaces
- Implement a small network
- Topology of network
- Connecting Router to LAN
- Implementing Vlan
- Static routing protocol
- Routing information protocol
- Open shortest path first protocol
- Investigate the TCP/IP and OSI Models in Action
- Telnet
- Point to point with password authentication protocol
- Exploration of TCP and UDP

   Pedagogy
- Demonstration of working environment/Tools/Software/Program

 Course Designer

 Mrs. V. Deepa

Course Code	Course Name	Category	L	T	P	Credit
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 frame works 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; L-Low.

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 of 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 Change 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 and Edition
1	Seema Gupta	Digital Marketing	McGraw Hill	2018, Education 2nd Editio

Reference Books

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

Pedagogy

● Lectures, Group discussions, Demonstrations, Case studies

Course Designer

Dr. G. Sangeetha

Course Code	Course Name	Category	L	T	P	Credit
CS23A02	M-Commerce	Theory	58	2	-	3

Preamble

This course provides an insight on M-Commerce principles and business models. It also explores 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; L-Low.

M-Commerce - CS23A02 (58 Hrs)
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	Publisher	Year and Edition
1	Dr. U.S. Pandey & Er. Saurabh Shukla	E- Commerce and Mobile Commerce Technologies	S. Chand & Company Pvt. Ltd	2014,2ndRevised Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Karabi Bandyopadhyay	Mobile Commerce	Prentice Hall India Learning Private Limited	2013,1st Edition,
2	Paul May	Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business	Cambridge University Press;	2001,1st Edition,
3	Norman Sadeh	M-Commerce: Technologies, Services, and Business Models	John Wiley & Sons,	2003,1st Edition,

Pedagogy
- Lectures, Group discussions, Demonstrations, Case studies

Course Designer
Dr. S. Nithya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23SCE1	**Coursera:** **R PROGRAMMING**	**Theory**		**-**	**45**	**3**

Coursera – R PROGRAMMING

Course Contents 45 Hrs

- Background, Getting started, and Nuts and Bolts-(13 hours)

- Programming with R (12 hours)

- Loop functions and debugging. (9 hours)

- Simulation and Profiling. (11 hours)

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

Preamble

This course has been designed to introduce the concepts and techniques of machine learning. It also emphasize various principles, algorithms, and applications of machine learning

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 Machine Learning Concepts.	K1
CLO2	Understand the features of machine learning to apply on real world problems	K2
CLO3	Apply various algorithms of supervised and unsupervised learning	K3
CLO4	Analyze the concepts of linear and non-linear activation functions	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

MACHINE LEARNING - AI23C10   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

Reference Book

S.No.	Authors	Title	Publishers	Year and Edition
1	Manaranjan Pradhan, U Dinesh Kumar	Machine Learning using Python	Wiley India, First edition	2019, 1st Edn
2	Aurelien Geron	Hands-On Machine Learning with Scikit Learn, Keras and Tensorflow Concepts Tools and Techniques to Build Intelligent Systems	OReilly Media, Second Edition	2019,2nd Edn

S.No	Author	Title of the Book	Publishers \Edition	Year and Edition
1	Tom M Mitchell	Machine Learning	Tata McGraw-Hill, New Delhi	2017, 1st Edn
2	Anuradha Srinivasa Raghavan, Vincy Joseph	Machine Learning	Wiley India, First edition	2019, 1st Edn
3	Zsolt Nagy	Artificial Intelligence and Machine Learning Fundamentals	Packt publisher	2018,1st Edn
4	Dr. S Sridhar Dr. M Vijayalakshmi	Machine Learning	Oxford University Press	2021,1st Edn

Pedagogy

   Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer

   Mrs. G. Rubadevi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23C11	**INTERNET OF THINGS**	THEORY	73	2	-	4

Preamble

The course covers the fundamentals of IoT, Understand IoT Market perspective, IoT Architecture and Data and Knowledge Management and use of Devices in IoT Technology. To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards. Apply the concept of Internet of Things in the real world scenario.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the vision of IoT from a global context.	K1
CLO2	Design a portable IoT using Arduino/ equivalent boards and relevant protocols.	K2
CLO3	Develop web services to access/control IoT devices.	K3
CLO4	Deploy an IoT application and connect to the cloud	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

INTERNET OF THINGS- IN23C11   73 Hrs

Syllabus
UNIT I

14Hrs

Introduction & Concepts: Definition & Characteristics of IoT - Physical Design of IoT: Things in IoT - IoT Protocols:MQTT Protocols - Logical Design of IoT: IoT Functional Blocks, Communication Models, Communication APIs - IoT Enabling Technologies: **Wireless Sensor Networks – Cloud Computing – Big Data Analytics – xCommunication Protocols** – Embedded Systems - IoT Levels & Deployment Templates.
Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail -Logistics – Agriculture – Industry – Health & Lifestyle.

UNIT II

15Hrs

IoT and M2M: M2M - **Difference between IoT and M2M** – SDN and NFV for IoT: Software Defined Networking – **Network Function Virtualization**.
IoT System Management with NETCONF-YANG: Need for IoT Systems Management – SNMP: Limitations of SNMP – Network Operator Requirements – NETCONF – YANG – IoT Systems Management with NETCONF-YANG: NETOPEER.

UNIT III   15 Hrs

IoT Platforms Design Methodology: Introduction - IoT Design Methodology – **Case Study on IoT System for Weather Monitoring.IoT Systems Logical Design using Python**: Introduction – Installing Python – Python **Datatypes and Data Structures** – Control Flow – Functions – Modules – Packages – File Handling – Date/Time Operations – Classes – **Python Packages of Interest for IoT.**

UNIT IV   15Hrs

Intel Galileo and Intel Galileo Gen 2: Why Use Intel Galileo Boards? The Software Advantages - **The Hardware Advantages - Hardware Overview. Arduino IDE and Wiring Language**: Installing the Drivers and the Arduino IDE - Understanding the Arduino IDE - Checking the Port and Board Selected - What Is a Sketch? - **Debugging with Serial Console and Serial Communication** - The Arduino Language Reference and APIs - Running Some Examples - Updating the Firmware Using the IDE.

UNIT V   14Hrs

IoT Physical Devices & Endpoints: **What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi** – Raspberry Pi Interfaces – Programming Raspberry Pi with Python.

IoT Physical Servers & Cloud Offerings: **Introduction to Cloud Storage Models & Communication APIs** – WAMP – AutoBahn for IoT – Python Web Application Framework – Django - Amazon Web Services for IoT.

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1.	ArshdeepBahga, Vijay Madisetti	Internet of Things – A hands-on approach	Hyderabad : Universities Press	2016,1st Edn
2.	Manoel Carlos Ramon,	Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers.	Apress	2014,1st Edn

Reference Book

S.No	Author	Title of the Book	Publishers \Edition	Year and Edition
1	David Easley and Jon Kleinberg	Networks,Crowds,andMarkets:ReasoningAboutaHighlyConnectedWorld UnitedKingdom	Cambridge University Press.	2010, 1st Edn
2	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press. New york	2012,1st Edn
2	Francis daCosta,	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	1st Edition, Apress Publications	2013, 1st Edn

Pedagogy
- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer

Dr.G.Sangeetha

OURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23C12	**SOFTWARE ENGINEERING AND TESTING**	THEORY	73	2	-	4

Preamble

The course is designed to impact the knowledge on building reliable software products. It also emphasize various testing's undergone to enhance the quality of the software.

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 software evolution, software engineering practice, life cycle models and testing concepts.	K1
CLO2	Understand on Agile models, various Phases of software Project and its life cyclemodels.	K2
CLO3	Apply the various building models, software testing tactics and its Methodologies.	K3
CLO4	Analyze the System, Acceptance and Performance Testing's criteria andits best practice.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

SOFTWARE ENGINEERING AND TESTING- IN23C12   73Hrs

Syllabus

UNIT I   **14 hrs**

Introduction to Software Engineering: The Evolving role of Software **- Software - Changing nature of Software - Legacy Software** - Software myths. Software Engineering Practice: Software engineering practice - Communication practices - Planning practices - Modeling practices - Construction practice-Deployment.

UNIT II   **15 hrs**

Software Development Life Cycle models: **Phases of Software project-Quality, Quality Assurance, Quality control** - Testing, Verification and Validation - Process Model to represent Different Phases - Life Cycle models.

UNIT III   **15 hrs**

Agile Development: Agile Process –Agile Process Model-Building the Analysis Model: Requirement Analysis - **Data Modeling concepts - Object Oriented Analysis -Flow Oriented Modeling-**Design

Engineering: Design **concepts.**

UNIT IV   **14 hrs**

Testing Tactics: Software Testing Fundamentals -Types of Testing: White Box Testing - Static Testing-Structural Testing-Black box Testing**-Integration Testing: Integration testing-Integration Testing as Type of Testing.**

UNIT V   **15 hrs**

System and Acceptance Testing: System Testing Overview-**Functional testing versus Non-functional Testing-Functional testing - Non-functional Testing** – Acceptance Testing and its criteria – Performance Testing: Factors governing Performance testing**.**

S.No	Authors	Title	Publishers	Year and Edition
1.	Roger S. Pressman	Software Engineering: A Practitioner's Approach	McGraw-Hill Education,	2011,6th Edn
2.	Srinivasan Desikan , Gopalaswamy Ramesh	Software Testing Principles and Practices	Pearson Education	2012,1st Edn

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Rajib Mall	Fundamentals of Software Engineering	Prentice Hall of India Pvt Ltd,	2010,3rd Edn
2.	Sandeep Desai, AbhishekSrivastava	Software Testing: A Practical Approach	PHI Learning Pvt. Ltd	2012,1st Edn
3.	David Burns	Selenium 2 Testing Tools: Beginner's Guide	Tata MCGraw Hill Edition	2012,1st Edn

Reference Books

Pedagogy
- Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Dr. R. Jeevitha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23E01	CLOUD COMPUTING	THEORY	73	2	-	5

Preamble

Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and thepossible applications for state-of-the-art cloud computing.

Course Learning Outcomes

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

CO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of cloud computing, data center and cloud Environment	K1
CLO2	Understand the nature of the cloud, value of cloud for business, managing the data and cloud service	K2
CLO3	Apply the various cloud services like IaaS, PaaS and cloud environment	K3
CLO4	Analyze the Service-oriented architecture, cloud strategy , Virtualization	K4

Mapping with Programme learning outcomes

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

S- Strong; M-Medium.

CLOUD COMPUTING- IN23E01
73 Hrs

Syllabus

UNIT I   14 hrs

Introduction cloud computing: Grasping the fundamentals- **Discovering the value of the cloud for business getting inside the cloud**-developing your cloud strategy.

UNIT II   15 hrs

Understanding the nature of the cloud-seeing the advantages of highly scaled data centre-**Exploring the technical foundation for scaling computer systems**-checking the cloud workload strategy – managing data.

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UNIT III   14 hrs

Examining the cloud elements: **Seeing infrastructure as a service**-Exploring platform as service.

UNIT IV   15 hrs

Managing the cloud: **Managing and securing cloud service** – Governing the cloud –Virtualization andthe cloud.

UNIT V   15 hrs

Managing the cloud: **Managing desktops and devices in the cloud- Service-oriented architecture and thecloud** – Managing the cloud environment.

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1.	Judith Hurwitz,Robin Bloor Marcia Kaufman and Dr. Fernhalper	Cloud Computing For Dummies	Willey India Publication Edition	2010,1st Edn

Reference Books

S.No	Author	Title of book	Publisher	Year and Edition
1	Prasant Kumar Pattnaik	Fundamentals of Cloud Computing	Vikas Publishing House	2014,1st Edn
2	RajkimarBuyya.,et.al	Cloud Computing: Principles and Paradigms	Wiley publications	2013,1st Edn

Pedagogy
- In Class lecture , PPT, Discussion, Assignment, Seminar ,Quiz.

Course Designer
Dr. G. Sangeetha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23E02	**WIRELESS SENSOR NETWORKS**	THEORY	73	2	-	5

Preamble

The course is designed to understand about the networking sensor routing and networking database. Examine the essential sensor nodes, general issues and energy constraints. Learn the networking and sensor platform tools.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the applications, platforms and tools of sensor network,	K1
CLO2	Understand the challenges in sensor network database, high level database organization	K2
CLO3	Apply the geographic and energy aware routing, collaborative processing and future research directions	K3
CLO4	Analyze the medium access control, temporal data and emerging applications	K4

Mapping with Programme Learning Outcomes

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

S – Strong; M – Medium.

WIRELESS SENSOR NETWORKS- IN23E02   73 Hrs

Syllabus

UNIT1   14hrs

Introduction: Unique Constraints and challenges of sensor network – Advantages of sensor Network –**Sensor Network Applications – Collaborative Processing** – Definition of Sensor Networks

UNITII   15hrs
Networking Sensors: Medium Access Control – **General issues - Geographic, Energy Aware Routing** – Attribute Based Routing.

UNITIII   15hrs
Sensor Network Database: challenges - **Querying the physical environment – High level database organization –**Network Aggregation -Data centric storage – Temporal Data.

UNIT IV   15hrs
Sensor Network Platforms and Tools: Sensor node hardware – **Sensor Network Programming challenges** - Node level Software platforms – **Node level simulators.**

UNITV   14hrs
Application and future Directions**: Emerging Applications** - Future Research directions.

Text Books

S.NO	AUTHOR	TITLE OF BOOK	PUBLISHER	YEAR and EDITION
1	Fengzhao and Leonidas J. Guidas	Wireless Network- An Information processing Approach	Elesiver publication	2007,2nd Edn

Reference Books

S.NO	AUTHOR	TITLE OF BOOK	PUBLISHER	YEAR and EDITION
1	Fengzhao and Leonidas J. Guidas	Wireless Sensor Network Design	John willey	2003,2nd Edn
2	Kazemsohraby Daniel minoli and Taiedznati	Wireless sensor network-Technology Protocol and Design	John willey	2007,1st Edn

Pedagogy
In Class lecture, PPT, Discussion, Assignment, Seminar, Quiz.

Course Designer

Mrs. G. Rubadevi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23E03	**COMPUTER GRAPHICS AND MULTIMEDIA**	THEORY	73	2	-	5

Preamble

The objective of this course is to provide a detailed understanding of the fundamentals of concepts 2D, 3D and multimedia file formats

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	To recall fundamental concepts of two dimensional graphics and transformations.	K1
CLO2	To understand and apply two dimensional graphics and transformations.	K2
CLO3	To apply illumination using various color models and file formats.	K3
CLO4	To analyze different multimedia file formats and techniques.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

COMPUTER GRAPHICS AND MULTIMEDIA- 73 Hrs

Syllabus

UNIT I   (14 Hrs)

Output Primitives: Points and Lines – Line-Drawing algorithms – Loading frame Buffer – **Line function – Circle-Generating algorithms** – Ellipse-generating algorithms. **Attributes of Output Primitives: Line Attributes** – Curve attributes – Color and Gray scale Levels – Area-fill attributes – Character Attributes.

UNIT II   (15 Hrs)

2D Geometric Transformations: Basic Transformations – Matrix Representations Composite Transformations – Other Transformations. **2D Viewing: The Viewing Pipeline-**Viewing Co-ordinate - Reference Frame–Window-to-Viewport Co-rdinate Transformation–**2D Viewing Functions–Clipping Operations.**

UNIT III   (14 Hrs)

Introduction to Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression

– File formats. **Image:** Image Types – **Color Models** – Basic Steps for Image Processing - Digital Camera – Interface Standards – Specification of Digital Images – CMS – Device Independent .Color Models – **File Formats** – Image Output on Monitor and Printer.

UNIT IV   (15 Hrs)

Introduction to Audio – Acoustics – Nature of Sound Waves – **Fundamental Characteristics of Sound** – Microphone – Amplifier – Loudspeaker – Audio Mixer – **Digital Audio** – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – **Audio Transmission – Audio File formats and CODECs** – Audio Recording Systems – **Audio and Multimedia** – Voice Recognition and Response – Audio Processing Software.

UNIT V   (15 Hrs)

Introduction to Video: Transmission of Video Signals – Video Signal Formats – Television Broadcasting Standards – **Video File Formats and CODECs** – Video Editing – Video Editing Software. **Animation: Types of Animation** – Computer Assisted Animation – Principles of Animation – Some Techniques of Animation - Rendering Algorithms. Compression: MPEG-2 Audio – MPEG-2 Video.

Text Book

S.No	Author	Title of book	Publisher	Year and Edition
1	Donald Hearn, M.Pauline Baker	Computer Graphics C Version	Pearson Education	2018, 2nd Edn
2	Ranjan Parekh,	Principles of Multimedia	McGraw Hill Principles	2007, 2nd Edn

Reference Books

S.No	Author	Title of book	Publisher	Year and Edition
1.	Amarendra N Sinha, Arun D Udai	Computer Graphics	Mcgraw Hill Education	2014, 1st Edn
1.	Tay Vaughan	Multimedia: Making It Work, Eighth Edition	Osborne/McGraw-Hill	2014, 9th Edn

Pedagogy

Chalk and talk, PPT, Group Discussion, Assignment

Course Designer

Dr. P. Parvathi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23CP5	IoT LAB	PRACTICAL	-	-	75	3

Preamble

The course is designed to develop IoT based applications using structured and object oriented programming with the help of Arduino / Raspberry Pi boards. It covers the overall concepts of Interface, Sensor and Network together. And it also gives knowledge to install and configure R tool for an analytics programming environment and gain basic analytics skills via this high-level analytical language.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Defining the basic concepts of IoT in embedded devices.	K1
CLO2	Discussing on the IoT applications for connecting into communication modules	K2
CLO3	Analyzing the networks in current area using sensors.	K3
CLO4	Applying the interface concepts for developing IoT applications on different devices.	K4

Mapping with Programme Learning Outcomes

S- Strong; M-Medium ; L-Low

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

IoT LAB- IN23CP5   **75 Hours**

Program List
ARDUINO:

- Write a program to sense the available networks in your computer using Arduino.

- Write a program to measure the distance using ultra sonic sensor and make LED Blink using Arduino.

- Write a program to detect the vibration using vibration sensor using Arduino.

- Write a program to connect with the available wifi using Arduino.

- Write a program to sense a finger when it is placed in board Arduino.

- Write a program to get temperature notification using Arduino.

- Write a program for LDR to vary the light intensity of LED using Arduino.

RASPBERRY PI:

- Write a python program to get 10 numbers from the user and display the numbers in odd and even form separately in Raspberry pi.

- Write a program to add a power button to Rasberry Pi.

- Write a program to switch light on when the input is 1 and switch the light off when the input is 0 using Rasberry Pi.

Pedagogy

- Demonstration of working environment/Tools/Software/Program

Course Designer
   Dr.R.Jeevitha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23SBP1	DATA VISUALIZATION TOOLS LAB	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; L-Low

List of Programs- IN23SBP1

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 histogram 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

11. Create a boxplot for given data

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

Dr. S. Beula Princy

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23AC1	**DATA MINING**	Theory	-	-	-	5

Objective

This paper helps the students to gain knowledge about various techniques used in variety of industries. Data mining has become an essential practice for maintaining a competitive edge in every phase of the customer life cycle. To understand various tools of Data Mining and their techniques to solve the real time problems

DATA MINING – IN23AC1

UNIT-I

Introduction -What is Data mining , Data mining -important Data mining -various kind of data Data mining Functionalities –Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

UNIT-II

Data Processing -Process the Data Descriptive Data Summarization –Measuring Central Tendency Dispersion of Data Graphic Displays of –Basic Descriptive Data Summaries Data Cleaning. Data Integration and Transformation- data Reduction-Data Discrimination -Concept Hierarchy Generation.

UNIT-III

Data Warehouse OLAP Technology An overview -Data Warehouse Multidimensional Data Model, Data Warehouse Architecture- Data Warehouse Implementation From Data Warehouse to Data Mining

UNIT-IV

Mining –Frequent Patterns Associations Correlations -Basic Concepts Road Map Efficient Scalable Frequent Item set Mining methods Mining –Various Kinds of Association rules Analysis -Association mining to Correlation Constrain Based Association mining

UNIT-V

Applications Trends - Data mining –System Products Research Prototype Additional Themes on Data Mining Social impact of Data mining Trends in Data mining.-Real time applications of Data mining.

Text Books

S.NO	AUTHOR	TITLE OFBOOK	PUBLISHER	YEAR OF PUBLICATION
1	Karguta, Joshi, Sivakumar	Data Mining	PHI	2007,1st Edition
2.	Ian H. Witten &Eibe Frank	Data Mining	Morgan Kaufmann Publishers	2009,2nd Edition

Reference Books

S.NO	AUTHOR	TITLE OF BOOK	PUBLISHER	YEAR OF PUBLICATION

1	Jiawei Han and MichelineKamber	Data Mining Concepts and Techniques	Morgan Kaufmann Publishers	An imprint of Elsevier
2.	N.P.Gopalan,B.Sivaselvan	Data Mining Techniques and Trends	PHI	2009,1st Edition

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23AC2	**BIO-INSPIRED COMPUTING**	Theory	-	-	-	5

Objective

Understand the concepts of document representation, document indexing, digital information storage, retrieval, and distribution. Summarize the advantages and disadvantages of different information- retrieval design models. Translate vague information needs into specific queries that a given IR system can parse and execute correctly.

BIO-INSPIRED COMPUTING

UNIT - I
Natural to Artificial Systems – Biological Inspirations in problem solving – Behavior of Social Insects: Foraging - Division of Labor - Cemetery Organization and Brood Sorting – Nest Building- Cooperative transport.

UNIT - II
Ant Colony Optimization [ACO]: Ant Behavior - Towards Artificial Ants - Combinatorial Optimization - Ant Colony Optimization Metaheuristic – Problem solving using ACO- Extensions of Ant Systems

UNIT - III
Routing problems-Assignment problems - Scheduling problems – Subset problems - Machine Learning Problems – ACO for Travelling Salesman problem.

UNIT - IV
Swarm Intelligence: Biological foundations of Swarm Intelligence – Swarm Intelligence in Optimization – Particle Swarms for dynamic optimization problems.

UNIT - V
Biological Inspired computing to Natural Computing – Integration of Evolutionary Computation Components in Ant Colony Optimization – Particle Swarm Optimization based on Socio- cognition.

Text Book

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	Marco Dorigo, Thomas Stutzle,	"Ant Colony Optimization",	MIT Press,	2004
2	Leandro N De Castro, Fernando J Von Zuben,"	Recent Developments in Biologically Inspired Computing"	Idea Group Inc	2005

Reference Books

S.NO	AUTHOR	TITLE OF BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Eric Bonabeau, Marco Dorigo, Guy Theraulaz, "	Swarm Intelligence: From Natural to Artificial Systems	Oxford University press	2012, 1st Edition
2	Christian Blum,Daniel Merkle (Eds.),	Swarm Intelligence: Introduction and Applications",	Springer Verlag	2008

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23C13	FULL STACK DEVELOPMENT	THEORY	73	2	-	4

Preamble

This course gives the basic principle, strategies and methodologies of Full Stack web development. The Course is designed to develop dynamic web page using scripting languages and various styles with JavaScript and jQuery for web application.

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 JavaScript with HTML, XML.	K1
CLO2	Understand the various designing concepts for dynamic presentation effect in JavaScript documents.	K2
CLO3	Apply the mark-up languages and Scripting languages for processing, identifying and presenting information in web pages with JQuery.	K3
CLO4	Analyze the web page design requirements and design web pages using Jquery.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

Syllabus-Full Stack Development IN23C13- 73 Hours

UNIT I: (14 Hrs)

JavaScript's Role in the World Wide Web and Beyond: Web Traffic-Other Web technology -

JavaScript: A Language for All - JavaScript: The Right Tool -Selecting and using Tools: The Software Tools- Setting Up the Authoring Environment - Validate - Creating Your First Script - JavaScript Essentials - Combining JavaScript with HTML - Designing for Compatibility - Language Essentials for programmers - JavaScript: First JavaScript - Browser and Document Objects - Scripts and HTML Documents.

UNIT II: **(15 Hrs)**

Programming Fundamentals: Working with Information -Variables - Expression and Evaluation - Data Type Conversion - Operators - Decision and Loops - Control Structures - Repeat Loops - Functions - Curly Braces - Arrays - Window and Document Objects Forms and Form Elements - Strings, Math and Dates - Scripting Frames and Multiple Windows - Images and Dynamic HTML.

UNIT III: **(15 Hrs)**

JavaScript for Language Reference: The String Object-The Math, Number and Boolean Objects - The Date Object- The Array Object -Json- Native JavaScript Object Notation -E4x-Native XML Processing- Control Structures and Exception Handling -JavaScript Operators - Function Objects and Custom Objects- Global Functions and Statements.

UNIT IV: **(15 Hrs)**

Document Object Reference: Window and Frame Objects - Location and History Objects- Document and Body Objects - Link and Anchor Objects - Image, Area, Map and Canvas Objects-Event objects.

INTRODUCTION TO JQUERY - jQuery Can - Develops jQuery - Obtaining jQuery - Installing jQuery - Programming Conventions – EVENTS - The Various   Event Wrapper Methods - MANIPULATING CONTENT AND ATTRIBUTES - Manipulating HTML and Text Content.

UNIT V: **(14 hrs)**

CSS – AJAX - Making a Server Request- Loading HTML Snippets from the   server - HTML5 DRAG AND DROP - Implementing Drag-and-Drop File Uploads.

Text Books

S.No	Author s	Title of book	Publisher	Year and Edition
1.	Danny Goodman, Michael Morrison,Paul Novitski, Tia Gustaff Rayl	JavaScript Bible	Wiley Publishing	2010, 7th Edn

| 2. | N.P.Gopalan, J.Akilandeswari | Web Technology A Developer's-Perspective | JPHI Learning Pvt.,Ltd | 2011, 4th Edn |
| 3. | Richard York | Web Development With JQUERY | John Wiley & Sons, Inc | 2015, 2nd Edn |

Books for Reference

S.No	Author	Title of book	Publisher	Year and Edition
1	AkankshaRastogi	Web Technology	K.Nath& Co Educational Publishers	2012, 1st Edn
2.	AnuranjanMisra, Arjun Kumar Singh	Intoduction to Web Technology	Laxmi Publication	2011, 1st Edn
3.	C.Xavier	World Wide Web Design with HTML	TMH Publishers	2008, 1st Edn
4.	Ray Rischpater	JavaScript JSON Cookbook	Packt Publishing Ltd.	2015, 1st Edn

Pedagogy
· Lecture, Group Discussion, PPT

Course Designer
Dr.S.Beula Princy

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23C14	**ARTIFICIAL INTELLIGENCE OF THINGS**	**THEORY**	73	2	-	4

Preamble

This course provides an overview of Artificial Intelligence of Things (AIoT), focusing on the integration of AI and IoT technologies. Students will gain foundational knowledge in AI and IoT and will explore their combined applications in real-world scenarios.

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 principles of AI and IoT.	K1
CLO2	Design AI techniques can be applied in IoT environments to enhance decision-making, automation, and analytics.	K2
CLO3	Develop web services to access/control IoT devices.	K3
CLO4	Explore practical applications of AIoT across various industries.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

ARTIFICIAL INTELLIGENCE OF THINGS- IN23C14-73 Hrs

Syllabus

UNIT I:

(14Hrs)

Artificial Intelligence (AI): Introduction To AI: Definition Of AI, History, And Evolution –Intelligent Agents-Solving Problems By Searching: Uninformed And Informed Search Strategies- Heuristic Functions-Local Search Algorithms And Optimization Problems- Adversial Search: Games-Optimal Decisions In Games-Alpha-Beta Pruning. Constraint Satisfaction Problems

UNIT II:

(15Hrs)

Artificial Intelligence Of Things: Internet of Things- Artificial Intelligence-Artificial Intelligence of Things-Applications-The Convergence Of AIoT -AIoT Architecture: Mobile Edge Computing Module- AI Module. Communication And Networks: AI Usage In Communication Systems. Existing Challenges And Issues-Security In AIoT Networks

UNIT III: **(15 Hrs)**

Networking And Protocols For AIoT Networks: AIoT Networking Stack -AIoT Computing Layers: Device Layer-

Network Layer- Cloud Layer- Application Layer.

AIoT Protocols: Machine Learning Algorithms -Deep Learning Algorithms -Reinforcement Learning. AIoT Communication Protocols: MQTT -CoAP (Constrained Application Protocol) -AMQP (Advanced Message Queuing Protocol)- DDS (Data Distribution Service)

UNIT IV: **(15Hrs)**

AIoT Application Development- The Impact Of AIoT On Connectivity -Benefits Of AIoT Application Development - AIoT Application Development Trends -Key Components Of AIoT Applications -Challenges In AIoT Application Development - AIoT Application Development Platforms And Tools-Steps To Develop An AIoT Application**.**

UNIT V   **(14Hrs)**

AIoT Applications And Services- Introduction - Artificial Intelligence In IoT Applications: AI Usage In AIoT Networks- Biometrics – Artificial Intelligence In Vehicles -AI Enabled Voice Assistants-Robots-Smart Devices - Automobiles - Smart Transport and AIoT -Smart Healthcare And AIoT -Ecological Smart Farming and AIoT -Automation and Computer

S.No.	Authors	Title	Publishers	Year and Edition
1.	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach	Hyderabad : Universities Press	2020 ,4th Edn
2.	Kashif Naseer Qureshi and Thomas Newe	Artificial Intelligence of Things (AIoT)New Standards, Technologies and Communication Systems	Taylor & Francis Group, LLC	2024, Ist Edn

Vision In AIoT- Cyber Security In AIoT

Text Book

Web   Link: https://www.iot83.com/blog-posts/the-future-of-connectivity-exploring-aiot-application-development

   Book for Reference

S.No	Author	Title	Publishers \Edition	Year and Edition
1	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press. New york	2012,1st Edn
2	Francis daCosta,	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	Apress Publications	2013,1st Edn

Pedagogy

- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
   Mrs.G.Rubadevi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23E04	**NATURAL LANGUAGE PROCESSING**	**THEORY**	**73**	**2**	**-**	**4**

Preamble
- To introduce the fundamentals of NLP, including linguistic foundations, core algorithms, and machine learning approaches.
- To provide knowledge on text processing, parsing, semantic analysis, and information extraction techniques.
- To explore the applications, strengths, limitations, and ethical concerns of NLP in industry and research.

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 language processing, morphology and syntax.	K1
CLO2	Understand text processing, parsing techniques and semantics.	K2
CLO3	Apply NLP algorithms for POS tagging, parsing, sentiment analysis, and text classification.	K3
CLO4	Analyze advanced topics such as machine translation, dialogue systems, and deep learning for NLP.	K4
CLO5	Evaluate NLP models and applications with respect to performance, scalability, and ethical use.	K5

Mapping with Programme Learning Outcomes

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

S- Strong; M- Medium

UNIT I – Fundamentals of NLP   **(15 hrs)**

Introduction to Natural Language Processing – Role in AI – Basics of Linguistics: Phonology, Morphology, Syntax, Semantics, Pragmatics – Language Modelling: Regular Expressions, N-grams, Probability Basics – Text Processing: Tokenization, Stemming, Lemmatization, Stop-word removal.

UNIT II – Syntax and Parsing   **(15 hrs)**

Part-of-Speech (POS) Tagging – Rule-based and Statistical approaches, HMM (Concept only) – **Parsing:** Context-Free Grammar (CFG) and Constituency Parsing – Dependency Parsing – Algorithms and Applications of Parsing – Evaluation of Parsing.

UNIT III – Semantics and Representation   **(14 hrs)**

Word Sense Disambiguation (WSD) – Semantic Networks and Frames – Distributional Semantics – Vector Space Models, Word Embeddings (Word2Vec, GloVe) – Lexical Resources**:** WordNet, ConceptNet.

UNIT IV – Applications of NLP   **(14 hrs)**

Text Classification: – Naïve Bayes, SVM, Neural Approaches (Overview) – Sentiment Analysis: Rule-based & ML methods – Information Extraction: Named Entity Recognition (NER), Relation Extraction – Machine Translation: Rule-based, Statistical MT, Neural MT(Overview).

UNIT V – Advanced NLP and Emerging Trends   **(15 hrs)**

Question Answering Systems – Dialogue Systems and Chatbots – Deep Learning for NLP: RNNs, LSTMs, Transformers (BERT, GPT – Conceptual Overview) – Ethical Issues in NLP: Bias, Privacy, Responsible AI.

Textbooks

S. No	Author(s)	Title of the Book	Publisher	Year and Edition
1	Sini Raj Pulari, Umadevi Maramreddy, Shriram K. Vasudevan	Natural Language Processing	Oxford University Press, 2023	2023 ,1st Edn
2	U.S. Tiwary and Tanveer Siddiqui	Natural Language Processing and Information Retrieval	Oxford University Press, 2008	2008, 1st Edn

Reference Books

S. No	Author(s)	Title of the Book	Publisher	Year and Edition
1	Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana	Practical Natural Language Processing	O'Reilly,	2020 , 1st Edn
2	Sunil Patel	Getting Started with Deep Learning for Natural Language Processing	BPB Publications, 2021	2021,1st Edn
3	Jacob Eisenstein	Introduction to Natural Language Processing	MIT Press,	2019,1st Edn

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

Dr. T. Sangeetha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23E05	BLOCKCHAIN TECHNOLOGY	Theory	73	2	-	4

Preamble

This course introduces the fundamentals of blockchain technology. It covers the history of digital money and distributed ledgers, design primitives, cryptographic foundations, blockchain architecture, and consensus mechanisms.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall blockchain history, design primitives, crypto basics, and consensus mechanisms.	K1
CLO2	Understand Bitcoin mechanics including transactions, scripts, blocks, and network operations.	K2
CLO3	Apply blockchain in financial services, supply chain management, and government systems.	K3
CLO4	Analyze privacy and security issues in blockchain and evaluate mitigation techniques.	K4

Mapping with Programme Learning Outcomes

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

S – Strong; M – Medium

BLOCKCHAIN TECHNOLOGY- IN23E05   **73 Hours**

Unit I   **(14 Hours)**

History: Digital Money to Distributed Ledgers – Design Primitives (Protocols, Security, Consensus, Permissions, Privacy) – Blockchain Architecture – Basic Crypto Primitives: Hash, Signature – Hash Chain to Blockchain – Basic Consensus Mechanisms.

Unit II   **(15 Hours)**

Centralization vs. Decentralization – Distributed Consensus – Consensus without Identity – Incentives & Proof of Work – Bitcoin Transactions – Bitcoin Scripts – Applications – Bitcoin Blocks – Bitcoin Network.

Unit III   **(15 Hours)**

Bitcoin Storage & Usage – Local, Hot & Cold Storage – Splitting/Sharing Keys – Online Wallets – Exchanges – Payment Services – Transaction Fees – Currency Exchange Markets.

Unit IV   **(15 Hours)**

Blockchain in Financial Software & Systems (FSS): Settlements, KYC, Capital Markets, Insurance. Blockchain in Supply Chain: Provenance, Visibility, Finance, Invoice Management. Blockchain for Government: Digital Identity, Land Records, Public Distribution & Welfare Systems.

Unit V   **(14 Hours)**

Privacy & Security Issues – Pseudo-anonymity vs. Anonymity – Zcash & Zk-SNARKs – Attacks: Sybil, Selfish Mining,– Advanced Consensus: Algorand, Sharding.

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1	Mark Gates (Unit1 and Unit 2)	Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money	Wise Fox Publishing and Mark Gates	2017 , 1st Edn
2	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder (Unit 3)	Bitcoin and Cryptocurrency Technologies	-	2016, 1st Edn
3	Bahga, Vijay Madisetti (Unit 4 and Unit 5)	Block chain Applications: A Hands-On Approach	Arshdeep Bahga, Vijay Madisetti publishers	2017, 1st Edn

Reference Book

S.No.	Authors	Title	Publishers	Year and Edition
1	Andreas Antonopoulos	Mastering Bitcoin: Unlocking Digital Crypto currencies	O'Reilly Media, Inc	2014,1st Edn
2	Melanie Swa	Block chain	O'Reilly Media	2014,1st Edn

Pedagogy
- Lectures, Group discussions, Demonstrations

Course Designer
Ms. S. Devipriya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23CP6	FULL STACK DEVELOPMENT LAB	PRACTICAL	-	-	75	2

Preamble

To provide students with hands-on experience in client-side scripting, enabling them to understand and apply the fundamentals of JavaScript for creating dynamic and interactive web pages. The course emphasizes DOM manipulation, event handling, and form validation, while also introducing arrays, objects, and simple data handling techniques.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand and apply basic JavaScript syntax and constructs (variables, data types, operators, loops, and conditions).	K1
CLO2	Use JavaScript for DOM manipulation and form validation.	K2
CLO3	Demonstrate the ability to handle events and exceptions in JavaScript.	K3
CLO4	Design and develop interactive web pages using HTML, CSS, and JavaScript.	K4

Mapping with Programme Learning Outcomes

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

 S- Strong; M-Medium ;

FULL STACK DEVELOPMENT LAB- IN23CP6   75 Hours

Program List

1. Write a JavaScript program that accept two integers and display the larger
2. Write a JavaScript conditional statement to sort three numbers. Display an alert box to show the result.

3. Write a JavaScript function to check whether an `input` is an array or not
4. Write a JavaScript program to sort the items of an array
5. Write a Program to show blinking effect on a web page using JavaScript.
6. Design a digital clock using JavaScript and CSS.
7. Design a calculator using HTML & JavaScript.
8. Write a JavaScript program to demonstrate Event Handling.
9. Write a Program to validate Email Address in JavaScript.
10. Write a program to demonstrate exception handling in JS
11. Write a program to create a website using HTML CSS and JavaScript.
12. Write a program to build a Chat module using HTML CSS and JavaScript.

Pedagogy

· Demonstration of working environment/Tools/Software/Program

Course Designer
Dr.S.Beula Princy

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23SBP2	SOFTWARE TESTING TOOLS	PRACTICAL	-	4	41	3

Preamble

The objective of this course is to understand the importance of test automation and to impart the features of selenium web driver tool and to develop automated tests for web applications.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the features & components Selenium Web Driver Tool	K1
CLO2	Explore to design and implement test automation framework for a software project	K2
CLO3	Apply the knowledge to adapt and develop automated tests for web applications	K3
CLO4	Demonstrate the steps to develop automated tests for web applications	K4

Mapping with Programme learning Outcomes

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

S- Strong; M-Medium;

SOFTWARE TESTING TOOLS- IN23SBP2   (45 Hours)

- Write a test case based on controls.
- Test data in a flat file.
- Manual test case to verify student grade
- Write and test a program to select the number of students who have scored more than 60 in any one subject (or all Subjects)
- Write and test a program to login a specific web page.
- Write and test a program to get the number of list items in a list / combo box.
- Test a HTML file.
- Test a program in MS Excel for Data Driven Wizard.
- Write a test suite containing minimum 4 test cases.

Pedagogy

- Demonstration of working environment/Tools/Software/Program
  Course Designer
  Dr.P.Parvathi

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN22AC3	ROBOTIC PROCESS AUTOMATION	THEORY	-	-	-	5

Preamble

Robotic Process Automation aims to provide a comprehensive understanding of RPA technologies, methodologies, and their applications across various industries. This paper helps the students to acquire knowledge on robotic process automation, concepts, workflows, and automation tools. Students will explore real-world case studies, best practices, and the challenges associated with bot deployment.

ROBOTIC PROCESS AUTOMATION - IN22AC3
Syllabus

Unit I

RPA Foundations: RPA -History of RPA- Benefits of RPA- Downsides of RPA-RPA Compared to BPO, BPM, and BPA - Consumer Willingness for Automation- The Workforce of the Future- RPA Skills: On-Premises Vs. the Cloud- OCR - Web Technology- Programming Languages and Low Code- Automation- Waterfall, Agile, Scrum, Kanban and -DevOps.

Unit II

Process Methodologies – Lean -Six Sigma –Implementation of Six Sigma –Roles and levels of Six Sigma – Applying Lean and Six Sigma to RPA – Planning: RPA consulting – ROI for RPA –RPA use cases.

Unit III

Bot Development–Preliminaries-Installation of UiPath - Getting Started-Activities - Flowcharts and Sequences - Log Message -Variables - Loops and Conditionals - For Each Loop - Do While Loop and While Loop-IF/THEN/ELSE Conditionals -Switch-Debug-Common UiPath Functions

Unit IV

Email Automation - Move e-mails to another folder-Mark e-mail as read or unread - Save attachments and e-mails. Word Automation - Save document as a different file-Read text from a document- Export a word document as pdf. Excel automation: Write values into cells - Read values from cells- Save an excel file indifferent formats (Pdfs, CSV).

Unit V

RPA vendors - Comparison of RPA Tools : UiPath - Automation Anywhere - Blue Prism Tool – Kofax – Open Source RPA –Business model of Open Source –Pros and cons of Open Source Software - OpenRPA –ULVision –Robot Framework –Robocorp.

Text Books

S.No	Author	Title of the Book	Publishers	Year oand Edition
1	Tom Taulli	The Robotic Process Automation Handbook-A Guide to Implementing RPA Systems	Apress	2020 , 1st Edn
2	Adeel Javed, Anum Sundrani, Nadia Malik, Sidney Madison Prescott	Robotic Process Automation using UiPath StudioX: A Citizen Developer's Guide to Hyperautomation	Apress	2021 ,1 st Edn

Books for Reference

S.No	Author	Title of the Book	Publishers	Year of Publication
1	NandanMullakara and Arun Kumar Asokan	Robotic Process Automation Projects	Packt Publishing	2020, 2ndEdn
2	Dr. Jisu Elsa Jacob andManjunath N	Robotics Simplified	BPB Publications	2022,1st Edn
3	Arun Kumar Asokan	UiPath Administration and Support Guide	Packt Publishing	2022,1st Edn

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Designer

- Dr. P. Parvathi.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN23AC4	**BIG DATA ANALYTICS**	**Theory**	**-**	**-**	**-**	**5**

Preamble

This Course deals with the Basics of Big Data and Hadoop architecture. It deals with working of MapReduce and Query Model of NoSQL Databases. It also includes the Advantages of MongoDB.

BIG DATA ANALYTICS – IN23AC4

UNIT – I

Overview of Big Data: Defining Big Data - Big Data Types – Big Data Analytics – Industry Examples of Big Data - Big Data and Data Risk – Big Data Technologies – Benefits of Big Data.

UNIT- II

Basics of Hadoop: Big Data and Hadoop – Hadoop Architecture – Main Components of Hadoop Framework – Analysing Big Data with Hadoop – Benefits of Distributed Applications – Hadoop Distributed File System – Advantages of Hadoop – Ten Big Hadoop Platforms.

UNIT-III

MapReduce: Introduction to MapReduce –Working of MapReduce – Map operations – MapReduce User Interfaces.

UNIT-IV

NoSQL Databases: NoSQL Data Management – Types of NoSQL Databases – Query Model for Big Data – Benefits of NoSQL – MongoDB – Advantages of MongoDB over RDBMS – Replication in MongoDB.

UNIT- V

HBase, CASSANDRA and JAQL: Introduction to HBase – Row-oriented and Column-oriented Data Stores – HDFS Vs HBase – Hbase Architecture – HBase Data Model – Introduction to Cassandra –Features of Cassandra . Introduction to JAQL – JSON – Components of JAQL.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1	V.K. Jain	Big Data and Hadoop	Khanna Book Publishing	2017,1st Edn

Reference Books

S.No	Author	Title of Book	Publisher	Year of Publication
1	Frank J Ohlhorst	Big Data Analytics: Turning Big Data into Big Money	Wiley and SAS Business Series	2012, 1st Edn
2	Anand Rajaraman, Jeffrey David Ullman	Mining of Massive Datasets	Cambridge University Press	2012, 1st Edn
3	Paul Zikopoulos, Chris Eaton, Paul Zikopoulos	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Tata McGraw Hill	2011, 1st Edn