DEPARTMENT OF BCA

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

BACHELOR OF COMPUTER APPLICATIONS

2022-2025 Batch

PROGRAMME LEARNING OUTCOMES (PLO's)- UG

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

PLO1: Design and Develop computer based systems with strong foundation in fundamentals and clarity on both conceptual and application oriented skills of various domains.

PLO2: Spark the reflective thinking process in various areas like information computing sectors, teaching and innovative researches.

PLO3: Work independently on a substantial software projects and as an effective team member.

PLO4: Inculcate the self directed learning in emerging technologies to upgrade them.

PLO5: Engaged in lifelong learning to equip them to the changing environment and be prepared to take up mastering programmes.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO1: The students will obtain an attitude to understand the societal issues and apply the acquired programming skills to develop system-based application.

PSO2: Students are capable to comprehend the technological advancements in the usage of modern tools to satisfy industry needs.

PSO3: A strong foundation to purse higher education in the fields of teaching and research.

Department of BCA
Choice Based Credit System & Learning Outcomes Based Curricular Framework
Bachelor of Computer Applications - 2022-2025 Batch

Semester	Part	Subject Code	Title of paper	Category	Instruction hours / week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks CA	ESE	Total	Credits
I	I	TAM2201/ FRE2201 /HIN2201	**Language I**	LAN	6	86	4	3	50	50	100	3
	II	ENG2101	**English Paper I**	ENG	6	86	4	3	50	50	100	3
	III	PP22C01	**Core – 1:** Programming in C	CC	4	56	4	3	50	50	100	4
	III	PP22C02	**Core – 2 :** Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100#	-	100	3
	III	AP22CP1	**Programming Lab – 1:** C Programming Lab	CC	3	45	-	3	25	25	50	2
	III	TH22A03	**Allied 1:** Numerical and statistical Techniques	GE	6	86	4	3	50	50	100	5
		NME21ES	Introduction to Entrepreneurship	AEC	2	26	4	2	100	-	100	
	IV	NME22A1/ NME22B1	Advance Tamil/ Basic Tamil	AEC	2	28	2	2	50	50	100	2
II	I	TAM2201/ FRE2201 HIN2201	**Language II**	LAN	6	86	4	3	50	50	100	3
	II	ENG2101	**English Paper II**	ENG	5	71	4	3	50	50	100	3
	III	AP22C03	**Core – 3 :** Object Oriented Programming with C++	CC	5	71	4	3	50	50	100	5
	III	AP22CP2	**Programming Lab –2:** C++ Programming Lab	CC	5	75	-	3	25	25	50	3
	III	TH22A06	**Allied 2:** Discrete Mathematics	GE	6	86	4	3	50	50	100	5
	IV		Open Course:(Self study-Online Course)	AEC	-	-	-	-	-	-	-	Grade
	IV	NME22A2/ NME22B2	**Advance Tamil/ Basic Tamil	AEC	-	-	-	-	-	-	-	Grade
	V	21PEPS1	Professional English for Physical Sciences	AEC	3	40	5	2	50	50	100	2
	VI	NM12GAW	General Awareness	AEC	Self Study	-	-	Online Test	100	-	-	Grade

Sem	Part	Course Code	Course Title	Category	Credit	Hours		Duration	CIA	ESE	Total	Credit/Grade
III	I	TAM2203A/ FRE2203A/ HIN2203A	Language III	Language	4	58	2	3	50	50	100	3
III	II	ENG2203A	English III	English	4	58	2	3	50	50	100	3
III	III	AP22C04	**Core – 4:** Operating Systems Fundamentals – Linux	CC	4	58	2	3	50	50	100	3
III	III	AP22C05	**Core – 5:** Data Structures using python	CC	4	58	2	3	50	50	100	3
III	III	AP22CP3	**Programming Lab-3:** DBMS Lab	CC	5	75	-	3	25	25	50*	4
III	III	TH22A13	**Allied A3:** Optimization Techniques	GE	4	58	2	3	50	50	100	3
III	III	AP22SBP1	**SBS I -** Data Analysis using Spreadsheet Lab	SEC	3	41	4	-	100	-	100	3
III	IV	NM22EVS	**Foundation Course II:** Environmental Studies	AECC	Self study	-	-	-	100	-	100	Grade
III	IV	NM22UHR	**Foundation Course III:** Universal Human Values & Human Rights	AECC	2	30	-	-	100	-	100	2
III	VI	JOB1625	**Job Oriented Course PHP /MYSQL**		-	-	-	-	-	-	-	Grade
IV		TAM2204A/	Language IV	Language	4	58	2	3	50	50	100	3
IV	I	FRE2204A/	Language IV	Language	4	58	2	3	50	50	100	3
IV		HIN2204A	Language IV	Language	4	58	2	3	50	50	100	3
IV	II	ENG2204A	English IV	English	4	58	2	3	50	50	100	3
IV	III	AP22C08	**Core – 6:** Computer Networks	CC	4	58	2	3	50	50	100	3
IV	III	AP22C09	**Core – 7:** JavaProgramming	CC	5	73	2	3	50	50	100	4
IV	III	AP22CP4	**Programming lab – 4:** Java Programming Lab	CC	4	60	-	3	25*	25*	50	3
IV	III	AP22A01 / CS22A02/ AP22A03	**Allied A4:** **Paper I:** Digital Marketing **Paper II:** M-Commerce **Paper III:** Digital Electronics and Microprocessor	GE	4	58	2	3	50	50	100	3

III/ IV	III	AP22SBP2/ AP21SBCE	**SBS : II -** Data Analytics: R Programming Lab/Course Era Course	SEC	3	41/45	4/-	-	100	-	100	3
IV	III	NM22DTG	**Foundation Course IV:** Design Thinking	Finishing School Part A	2	30	-	-	100	-	100#	2
IV	V	COCOACT	NSS / NCC / YRC / Sports &Games		-	-	-	-	-	-	100	1
IV		COM15SER	Community Oriented Service		-	-	-	-	-	-	-	Grade
III & IV	IV		**Job Oriented Course:** Amazon Web services/ Cisco Certified Network Associate/ Microsoft windows server administration/ Microsoft Power BI	-	-	-	-	-	-	-	-	Grade
V	III	AP22C11	**Core – 8:** .Net Programming	CC	5	73	2	3	50	50	100	4
V	III	AP22C12	**Core – 9:** Data Mining Techniques	CC	5	73	2	3	50	50	100	4
V	III	AI22C10	**Core - 10:** MachineLearning	CC	5	73	2	3	50	50	100	4
V	III	AP22E01 / AP21E02 / AP21E03	**Elective:** Computer Graphics/ Perl Programming / Client Server Technology	DSE	5	73	2	3	50	50	100	5
V	III	AP22CP5	**Programming Lab –5:** .Net Programming Lab	CC	5	75	-	3	25	25	50*	3
V / VI	III	AP21SBCE/ AP21SBP3	**Coursera :** Modern Application Development on AWS / **SBS III :** Data Analytics - Data Visualization Tools Practical	SEC	3	45/ 41	-/4	-	100	-	100	3
V	III	AP21AC1/ AP21AC2	**Advanced Learners Course#** Enterprise Resource Planning / Mobile EdgeComputing	ACC	-	-	-	3	25	75	100	5$
V	IV	NM21CS1	Cyber Security	AECC	2	30	-	-	100	-	100	Gr.
V	III	AP22COM	Comprehensive Exam	GC	-	-	-	1	-	100	100	Gr.
V	III	AP22INST	Field work / Institutional Training	DSE	-	-	-	-	100	-	100	2
I-V	VI	16BONL1 16BONL2	Online Course – I Online Course - II	ACC	-	-	-	-	-	-	-	-
V	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
VI	III	AP21C13	Cloud Computing	CC	5	73	2	3	50	50	100	4
VI	III	AP21C14	Software Project Management	CC	5	73	2	3	50	50	100	4

VI	III	AP21C15	Web Technology	CC	5	73	2	3	50	50	100	3
VI	III	AP21CP6	Web Technology Programming Lab	CC	5	75	-	3	25*	25*	50*	3
V/VI	III	AP21SBCE/ AP21SBP3	Modern Application Development on AWS / Data Analytics - Data Visualization Tools Practical	SEC	3	45/ 41	-/ 4	-	100	-	100	3
VI	III	AP21PROJ	Project and Viva – Voce	DSE	7	-	-	3	50	50	100	5
VI	III	IN21AC3 AP16AC4	ALC-Artificial Intelligence / Internet of Things	ACC	SS	-	-	3	25	75	100	5
I-V	VI	16BONL1 16BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-
I-VI	-		**TOTAL**	-							4000	140

** Outside Regular Class Hours
# Only Internal Assessment

*CA conducted for 50 converted to 25   *ESE conducted for 100 converted into 25

CC   : Core Courses   GE   : Generic Electives
AEC   : Ability Enhancement Courses   SEC : Skill Enhancement Courses
CA   : Continuous Assessment   ESE : End Semester Examination
FS Part A – Finishing School Part A.   DSE – Discipline Specific
ACC-Additional Credit Course   AECC- Ability Enhancement Compulsory Course
GC- General Courses   Gr-Grade
- Self Study
$Credits applicable to candidates who take up Advanced level Course examination
* CA conducted for 50 marks converted to 25,ESE conducted for 100 and converted to 25

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

Continuous Internal Assessment: 50 Marks (Semester I & II)

SECTION	MARKS	TOTAL
A – 4 X 2 Marks (No Choice)	08	
B – 4 X 6 Marks (No Choice)	24	50
C - 2 X 9 Marks (Internal Choice at same CLO Level)	18	

End Semester Examination: 100 Marks (Semester I & II)

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	100
C – 5x 12 Marks (Internal Choice at same CLO Level)	600-800	60	

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

Question from each unit comprising of (Semester III & IV)

SECTION	MARKS	TOTAL
A – 3 X 2 Marks (No Choice)	06	
B – 3 X 6 Marks (Internal Choice at the same CLO level)	15	60
C - 3 X 12 Marks (Internal Choice at the same CLO level)	36	

End Semester Examination: 5 x 20 = 100 Marks (Semester III - V)

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	
B – 5 x 6 Marks (Internal Choice at same CLO Level)	300	30	100
C – 5 x 12Marks (Internal Choice at same CLO Level)	600-800	60	

VALUE EDUCATION.AND HUMAN RIGHTS / ENTREPRENEURSHIP / DESIGN THINKING

QUIZ	ASSIGNMENT	PROJECT / CASE STUDY	TOTAL
50 Marks	25 Marks	25 Marks	100 Marks

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

Theory

	CIA I	CIA II	Model Exam	Assignment / Class Notes	Seminar	Quiz	Participation	Application of Knowledge, Innovation & Creativity	Attendance	Max. Marks
Core / Allied	7	7	10	4	5	4	5	5	3	50
SBS	5	5	15	-	-	-	-		-	25

CONTINUOUS INTERNAL ASSESSMENT (Semesters III - V)

Theory

	CIA	Model Exam	Seminar / Assignment/ Quiz	Class Participation	Attendance	Max. Marks
Core / Allied	10	20	10	7	3	50

Practical

	Model Exam	Lab Performance	Regularity in Record Submission	Attendance	Maximum Marks
Core / Allied	15	24	8	3	50

SKILL BASED SUBJECT PRACTICAL – [100 MARKS]

Test 1 (Theory / Practical)   : 50 marks

Test 2 (Theory / Practical / Project)   : 50 marks

Total   : 100 Marks

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

RUBRICS Assignment/ Quiz / Seminar
Maximum - 20 Marks (converted to 4 marks)

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

CLASS PARTICIPATION

Maximum - 20 Marks (Converted to 5 marks)

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

MAPPING OF PLOs WITH CLOs

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE- PP22C01					
CLO1	S	S	S	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	S	S	S
COURSE – PP22C02					
CLO1	M	S	S	S	M
CLO2	S	S	S	M	M
CLO3	S	M	S	S	S
CLO4	S	S	M	S	S
COURSE - AP22CP1					
CLO1	S	M	M	M	M
CLO2	S	M	M	M	M
CLO3	S	M	M	S	S
CLO4	S	M	M	M	S
COURSE - AP22C03					
CLO1	S	S	S	S	S
CLO2	M	M	S	M	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S
COURSE - AP22CP2					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	M	S	S	S
COURSE - AP22C04					
CLO1	M	M	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	M	S	S
COURSE - AP22C05					
CLO1	S	S	M	M	S

CLO2	S	S	M	M	**S**
CLO3	M	S	M	S	S
CLO4	S	S	S	**S**	**S**
COURSE - AP22CP3					
CLO1	M	S	S	S	S
CLO2	S	M	S	M	S
CLO3	S	S	M	S	S
CLO4	M	S	S	S	M
COURSE - AP22C08					
CLO1	S	S	S	S	S
CLO2	S	M	S	M	S
CLO3	M	S	S	S	S
CLO4	S	S	S	M	S
COURSE - AP22C09					
CLO1	S	S	S	S	S
CLO2	S	M	M	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	**S**	**S**
COURSE - AP22CP4					
CLO1	S	S	M	S	S
CLO2	S	S	M	S	S
CLO3	S	S	S	S	S
CLO4	S	M	M	M	S
COURSE - AP22A01					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S
COURSE - CS22A02					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	S	M
CLO4	S	S	S	M	S
COURSE - AP22A03					
CLO1	S	S	S	M	S
CLO2	M	M	S	M	S
CLO3	M	S	S	S	S
CLO4	S	S	S	M	S

COURSE - AP22SBP2					
CLO1	S	M	M	S	S
CLO2	S	S	S	S	S
CLO3	S	M	S	S	S
CLO4	S	S	S	S	S
COURSE - AP22C11					
CLO1	S	M	M	S	S
CLO2	S	M	M	M	S
CLO3	S	S	M	S	S
CLO4	S	M	S	S	S
COURSE - AP22C12					
CLO1	S	S	M	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S
COURSE - AI22C10					
CLO1	S	M	S	S	S
CLO2	M	S	S	S	S
CLO3	S	M	S	S	S
CLO4	S	S	S	S	S
COURSE - AP22E01					
CLO1	S	S	M	S	S
CLO2	M	S	S	S	S
CLO3	S	L	M	M	S
CLO4	S	M	S	S	S
COURSE - AP21E02					
CLO1	S	S	M	S	S
CLO2	S	M	S	M	S
CLO3	S	S	S	M	S
CLO4	S	S	M	S	S
COURSE - AP21E03					
CLO1	S	S	S	S	S
CLO2	S	S	M	M	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S
COURSE - AP22CP5					
CLO1	S	S	S	S	S
CLO2	S	S	M	S	S

CLO3	S	M	S	S	S
CLO4	M	S	S	M	S
COURSE - AP21SBP3					
CLO1	S	M	M	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S
COURSE - AP21AC1					
CLO1	S	S	S	S	S
CLO2	S	S	M	S	S
CLO3	S	M	S	S	S
CLO4	M	S	S	M	S
COURSE - AP21AC2					
CLO1	S	S	M	S	S
CLO2	S	S	M	S	S
CLO3	S	M	S	M	S
CLO4	S	S	S	M	S
COURSE - AP21C13					
CLO1	M	S	S	M	M
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	S	S
COURSE - AP21C14					
CLO1	S	S	S	M	S
CLO2	M	S	S	S	S
CLO3	M	M	S	S	S
CLO4	S	M	S	M	S
COURSE - AP21C15					
CLO1	S	S	S	M	S
CLO2	S	S	M	S	S
CLO3	M	S	S	M	S
CLO4	S	M	S	M	S
COURSE - AP21CP6					
CLO1	S	S	M	M	S
CLO2	S	M	S	M	S
CLO3	S	M	M	S	S
CLO4	S	M	S	S	S

COURSE - AP21SBP3					
CLO1	S	M	M	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S
COURSE - IN21AC3					
CLO1	M	M	S	L	S
CLO2	M	S	M	M	S
CLO3	S	M	S	M	S
CLO4	S	S	M	S	S
COURSE - AP16AC4					
CLO1	M	M	S	L	S
CLO2	M	S	M	M	S
CLO3	S	M	S	M	S
CLO4	S	S	M	S	S

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PP22C01	PROGRAMMING IN C	THEORY	56	4	-	4

Preamble
- *This course introduces fundamental programming constructs in C.*
- *It covers the concepts such as arrays, functions, structures, pointers and file handling.*
- *It provides comprehensive coverage on Industry 4.0*

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 and Industry 4.0 technologies	K1
CLO2	Understand the purpose of arrays, strings, structures, pointers and files to solve problems	K2
CLO3	Apply functions to solve problems using procedure oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic	K4

Mapping with Programme Learning Outcomes

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

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

PROGRAMMING IN C - PP22C01 (56 Hrs)

Syllabus

Unit I 12 Hrs
Overview of C - Constants Variables and Data types - Operators and Expressions - Managing Input and Output Operations - Decision Making and Branching - Decision Making and Looping.

Unit II 11 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 11 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 – Recursion – Scope Visibility and Life time of Variables.

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

Unit IV   **12 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.

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

Unit V   **10 Hrs**

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

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	E. Balagurusamy	Programming in ANSI C (Unit I – IV)	McGraw Hill Education	7th Edition, 2017
2	P. Kaliraj, T. Devi	Higher Education 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	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 Designers

1.Mrs.G.Sangeetha

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.	K1
CLO3	Apply algorithmic thinking to problem solving using tools Flowgorithm , Scratch, iPython.	K2
CLO4	Apply and analyze to solve domain specific problems using computational thinking concepts.	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L – Low

Computational and Algorithmic Thinking for Problem Solving -PP22C02   (45 hours)

Syllabus

Unit I   **7 hours**
        Basics: Introduction to Computational Thinking- Data Logic - History of Computational Thinking-Applications of Computational Thinking.

Unit II   **8 hours**
        Data- Information and Data - Data Encoding - Logic - Boolean logic - Applications of simple Propositional Logic. Tool: Flowgorithm and Scratch.

Unit III   **10 hours**

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 hours**

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

Unit V   **12 hours**

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 Designers

1. Mrs.T.S.Anushya Devi
2. Mrs.S.Kavitha
3. Mrs.V.Bharathi

Evaluation Pattern

Assessment	Number	Marks
Quiz (online or offline)	5	50
Class Activity	5	25
Group Projects (Domain Specific)	1	25
Total		100

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22CP1	C PROGRAMMING LAB	PRACTICAL	-	-	45	2

Preamble

- *To provide the hands on experience on C Programming and improve the practical skill set.*

- *The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code.*

- *To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs.*

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

C PROGRAMMING LAB – AP22CP1   (45 Hours)

LIST OF PROGRAMS

- Using different operators.

- Control Structures.

- Using arrays.

- String handling functions.

- User defined functions.

- Structures.

- Pointers.

- Working with files.
- Error handling function in files.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C03	OBJECT ORIENTED PROGRAMMING WITH C++	THEORY	71	4	-	5

Preamble

- *This subject is designed to provide the graduates with why and how of Object-oriented programming in C++.*

- *It also presents the concept of Object-oriented programming with a brief discussion on the important elements of Object-oriented programming analysis and design of systems with its Object-oriented programming capabilities.*

- *It provides all techniques of software development in the C++ Programming Language and demonstrates these techniques by the solution of a variety of problems.*

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the object oriented features and C++ concepts.	K1
CLO2	Understand the concepts of polymorphism, Function, inheritance, files manipulation and Exceptional Handling.	K2
CLO3	Describe the meaning of the object-oriented paradigm, and create class hierarchies using the object-oriented design process	K3
CLO4	Implement Object Oriented Programs concepts	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

OBJECT ORIENTED PROGRAMMING WITH C++ - AP22C03　　　　　　(71Hours)

Syllabus

UNIT I:　　　　　　　　　　　　　　　　　　　　　　　　(15 Hrs)

　　　Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOPs – Applications of OOPs – Beginning with C++: What is C++ – Applications of C++ – C++ statements – Structure of C++ program.
Tokens, Expressions and Control structures: Tokens – Keywords – Identifiers –constants – Expressions and their types – Basic and user defined data types – operators in C++ – Operator overloading – Operator precedence – Control structures- Functions in C++.

UNIT II:　　　　　　　　　　　　　　　　　　　　　　　(15 Hrs)

　　　Classes and Objects: Specifying a class– Defining member function– Nesting of member functions– Private member functions– Arrays within a class – Static data members – Static member functions – Array of objects – Objects as function arguments – Friendly functions – Constructors and

Destructors: Constructors – Parameterized constructors– Multiple constructors in a class – Constructors with default arguments – Copy constructors – Dynamic constructors – Destructors.

UNIT III : (11 Hrs)

Operator overloading– Type conversions. Inheritance: Defining derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract classes.

UNIT IV : (15 Hrs)

Pointers, Virtual functions and Polymorphism: Pointers – Pointers to Objects, this Pointer, Pointers to Derived classes- Virtual Functions. Managing console I/O operations: C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations. Working with files: Classes for file stream operations – Opening and closing a file – Detecting End of File- File pointers and their Manipulations.

UNIT V : (15 Hrs)

Templates: Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters. Exception Handling: Basics - Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism.

Text Book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Object Oriented Programming with C++	Tata Mc Graw Hill Publications, 6th Edition.	2013

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	BjarneStroustrup	The C++ Programming Language	Pearson Education, 4th Edition.	2014
2	Rajesh K.Shukla	Object Oriented Programming in C++	Wilsey India Pvt.Ltd, 1st, Edition.	2008
3	Robert Lafore	Object Oriented Programming in C++	Galgotia Publications, Pvt Ltd, 4th Edition.	2001
4	Tony Gaddis, Judy Walfers, GodferyMuganda	Starting Out with C++: Early Objects	Addison-Wesley publication, 8th Edition.	2013
5	Mt Somashekara, Ds Guru, Hs Nagendraswamy,	iented Programming With C++	Prentice Hall Of India	2014

Pedagogy:

- Chalk and Talk, PPT, Discussion, Interactive Teaching, Self-questioning by students, Group discussion, Quiz.

Course Designer:

- Dr.L.Sheeba
- Mrs.V.Bharathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22CP2	C++ PROGRAMMING LAB	PRACTICAL	-	-	75	3

Preamble

- *Hands on experience to the learners in C++ programming based on concept learned with program course.*
- *Implementation of OOP feature such as class, objects, inheritance, and polymorphism can be done.*

Course Learning Outcomes

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

CLO Numbe	CLO Statement	Knowledge Level
CLO1	Recall the fundamental programming concepts and methodologies which are essential to develop programs.	K1
CLO2	Understand the programming elements of constructors, destructors, Inheritance, Pointers and Virtual Functions, overloading, Pointers and File concepts.	K2
CLO3	Apply the concepts and principles of the programming language to the real-world problems.	K3
CLO4	Develop, debug, and implement a well-structured reusable program	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

C++ PROGRAMMING LAB – AP22CP2   **(75 hours)**

LIST OF PROGRAMS:

- Implementing Various Control Structures.
- Working with Arrays
- Implementing Inheritance.
- Using functions.
- Using Pointers.
- Implementing Function Overloading.
- Constructors and Destructors.
- Working with Virtual Base Classes & Abstract classes.
- File Manipulation.
- Implementing Exception Handling.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Dr. L. Sheeba
2. Mrs. V. Bharathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C04	**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

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

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 managementschemes.	K2
CLO4	Demonstrate deadlock, prevention and avoidance algorithms, storage management, various schedulingalgorithms 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 – AP22C04   **(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 Hill2nd Edition	2011
2	Williams E. Shotts	The Linux CommandLine: A Complete Introduction	John Wiley & Sons,,2nd Edition	2019
3	Jason Cannon	Linux for Beginners	Create space Independent Pub	2014

Pedagogy

Lecture, Discussion, Quiz, PPT

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C05	DATA STRUCTURES USING PYTHON	Theory	58	2	-	3

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

Course Learning Outcomes

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

CLOs Number	CLO Statement	Knowledge Level
CLO1	Identify the appropriate and optimal data structure for a specified application.	K1
CLO2	Understand the fundamentals of python and its applications inData Structures.	K2
CLO3	Illustrate the use of different non-linear data structures and their applications.	K3
CLO4	Demonstrate the use of techniques like hashing, trees and heapsin a variety of applications.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus DATA STRUCTURES USING PYTHON – AP22C05   (58 Hrs)

UNIT I: **(12 Hrs.)**

Basic Python Programming: Basic Program Elements – Control Statements - String and their Operations – **Built in Python Collections and their Operations** - Creating New functions – Catching Exceptions – Files and their Operations.

UNIT II: **(11 Hrs.)**

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

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

UNIT III: (11 Hrs.)

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

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

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

UNIT IV: (12Hrs.)

Linked Lists: Introduction to Linked List – Singly Linked List: Insert Node Operations – Delete Node Operations – Value At Operation – Implementation of Singly Linked List – Doubly Linked List: Insert Node Operations – Delete Node Operations – Value At Operation – Implementation of Doubly Linked List - **Applications of Linked List**. Trees: Introduction – Definitions – Binary Trees: Types of Binary Trees – Implementation of Binary Trees: Pointer Based Implementation – Array based Implementation – Linked List based Implementation – Traversal: In Order Traversal **– Pre Order Traversal – Post Order Traversal** – Level Ordered Traversal – Basic Operations : Inserting and Deleting a Node – Applications of Trees.

UNIT IV: (12 Hrs.)

Binary Search Trees: Introduction – Operation: Search Value – Insert a Node – Delete a Node – Implementation of Binary Trees. Sorting: Introduction **– Importance of Sorting Algorithm** – Exchange Sort: Bubble Sort – Selection Sort: Straight Selection Sort – Heap Sort – Insertion Sort: Simple Insertion Sort – Shell Sort – Divide and Conquer: **Merge Sort – Quick Sort**. Searching: Introduction – Linear Search: Working – Implementation – Binary Search: Working – Implementation – Tree Based Search – Hashing.

Text Books

S.no	Author	Title of book	Publisher	Year of publication
1	Kenneth A. Lambert	Fundamentals of Python Data Structures	Cengage Learning	2015
2	Shriram K Vasudevan, Abhishek S Nagarajan, Karthick Nanmaran	Data Structures Using Python	Oxford University Press	2021

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
1	Ellis Horowitz & Sartaj Sahani	Fundamentals of Data Structure	Galghotia Book Source, 1st Edition	2003
2	Rance D Necaise	Data Structures and Algorithms using Python	John willey & sons,	2011

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

Course Designers
1. Mrs. M. Selvanayaki

Course Number	Course Name	Category	L	T	P	Credit
AP22CP3	DBMS Lab	Practical	-	-	75	4

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

CLos	PLO 1	PLO2	PLO 3	PLO 4	PLO 5
CLO1	M	S	S	S	S
CLO2	S	M	S	M	S
CLO3	S	S	M	S	S
CLO4	M	S	S	S	M

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

DBMS LAB - AP21CP3 (60 Hrs)

1. A Case study and formulate the problem statement on a specific project.
2. Draw ER Diagrams with entities, attributes, keys, and relationships between entities, and cardinalities.
3. Draw tables with Normalization
4. Perform Data Definition Language statements (Create, Alter, Drop, Truncate, Rename)
5. Perform Data Manipulation Language statements (Select, Insert, Update, Delete)
6. Perform Transaction Control Language and Data Control Language statements (Grant, Revoke, Commit, Rollback, Savepoint)
7. Perform Data Integrity Constraints Operations (Primary key, Foreign key, Not null, Unique, Check)
8. Perform Aggregate Function and Sorting
9. Perform Joins Operations
10. Implement Sub Queries
11. Write PL/SQL program to perform Function
12. Write PL/SQL program to perform Procedure
13. Write a program to perform Triggers in PL/SQL
14. Write a program to perform Cursor operation in PL/SQL

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

Course Designers
1. Dr. R. Hepziba Ganamalar

Course Number	Course Name	Category	L	T	P	Credit
AP22SBP1	Data Analysis using Spreadsheet Lab	Practical	-	4	41	3

Preamble

- To explore some of the more advanced Excel features, such as financial functions,charts, logical functions, pivot tables, lists and look-up tables.

- It focuses on focuses on the use of advanced functionalities of Spreadsheet to create andanalyze data.

- To learn advanced functions such as financial functions, logical functions, lookup or reference functions, statistical functions and some information functions that are significant to manipulating and analyzing data and information.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify common business uses for spreadsheets.	K1
CLO2	Understand analysis features of a spreadsheet application	K2
CLO3	Develop professional-looking worksheets	K3
CLO4	Create and manipulate various types of functions, charts and enhance charts with drawing tools	K4

Mapping with Programme Learning Outcomes

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

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

Data Analysis using Spreadsheet lab   AP22SBP1   **(41 Hrs)**
List of Programs
1. Basic data manipulation in spreadsheets
2. Arithmetic manipulation in spreadsheets
3. Basic functions in spreadsheets
4. Absolute & Relative reference in spreadsheet
5. Usage of 'IF' command in spreadsheet

6. V Lookup function in spreadsheets
7. H lookup function in spreadsheets
8. Use of Pivot table in spreadsheets
9. Data filtering in spreadsheets
10. Construction of Bar charts,Pie charts,Line graphs
11. Construction of Histogram

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

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

JOB ORIENTED COURSE

SEMESTER   : III
&IV
TITLE   : PHP / MY SQL   SUB.CODE   : JOB1625
OBJECTIVE:

After completion of this course, students will able to write and understand PHP programs, and use it to build dynamic web pages; and they can install and configure third-party PHP packages.

UNIT I:

Introduction to web application, History of HTML, Tags, Documents, Browsers, Structural Elements, Input Elements, Introduction to PHP, What is PHP, Advantages of PHP, PHP with HTML, Wamp server Installation and configuration, Basic syntax, Data types, Variables, constants, expressions, Operators, Control structures, Arrays & Functions, String manipulation.

UNIT II:

Embedding PHP in HTML, operators, conditional statements, looping structures, PHP arrays, processing array elements, Session management, register session variables, destroy session, store and retrieve cookies.

UNIT III:

PHP functions, PHP data and time, File Systems Security, Error Handling, Interfaces, Namespaces, file include & require, file uploading, sending E-mails.

UNIT IV:

Understanding an RDBMS, DDL, DML and DCL, Introduction to MySQL database, understanding tables, records & fields, primary & foreign keys, database constraints, normalization, Creating Mysql database/tables, working with database and tables, dropping and backup database, alter field properties,

UNIT V:

Insert records, edit & delete records, update records, filtering records, using operators, sort records, limiting results. Display specific record, display group of records and applying condition. Introduction to Jscript, loops, objects, events and common Jscript functions, validations.

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Rasmus Lerdorf, Kevin Tatroe, Peter Maclntyre	Programming PHP	O'Reilly Media 3rd Edition	2013
2	Robin Nixon	Learning PHP MYSQL and Java Script	O'Reilly Media 4th Edition	2014
3	Paul Gibbs	Programming with PHP / MYSQL	-	2015
4	Timothy Boronczyk, Elizabeth Naramore, Jason Gemer	Beginning PHP6, Apache, MySQL Web Development	Wrox	2013

PHP / MYSQL LAB Questions

HTML

1) Print the squares of the numbers 1 - 10. Each number should be on a separate line, next to itthe number 2 superscripted, an equal sign and the result. (Example: $10^2 = 100$)

2) Print two lists with any information you want. One list should be an ordered list, the other listshould be an unordered list. Min 5 items

3) Display an image that when clicked will link to itself and will display the image in thebrowser by itself.

JAVASCRIPT

1) Write a JavaScript function that accepts a number as a parameter and check the number isprime or not.

2) Write a JavaScript function to compute the value of b^n where n is the exponent and b is thebases. Accept b and n from the user and display the result.

3) Write a JavaScript program to compute the sum and product of an array of integers.

4) We have the following arrays:

Color = ["Blue ", "Green", "Red", "Orange", "Violet", "Indigo", "Yellow "]; o = ["th","st","nd","rd"];

Write a JavaScript program to display the colors in the following way:"1st choice is Blue." "2nd choice is Green." "3rd choice is Red."

PHP

1. How to Install WAMP server and MySQL server.
2. How to create a function to perform addition of two numbers in PHP.
3. How to create a function to perform addition of two numbers in PHP.
4. Write a program to redirect a browser request to another web page
5. Write a program to display different image each time out of four images
6. Write a SQL statement to create a table **PURCHASE_ORDER** including columns

FIELD NAME	DATA TYPE	SIZE	DESCRIPTION
Pur_ord_id	Integer	5	Purchase order id
Pur_date	Date/Time		Purchase Date
Prod_name	Varchar	20	Product Name
Qty	Integer	3	Quantity
Price	Float		Price
Total	Float		Total amount

- Make sure that the column purchase order id will be unique and store an autoincremented value.
- Insert few records of your own from SQL Query.
- Display values in purchase_order table.

OURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C08	COMPUTER NETWORKS	Theory	58	2	-	3

Preamble

• To understand the protocol layering and physical level communication.

• To analyze the performance of a network and various components required to build different networks.

• To learn the functions of network layer and the various routing protocols.

• To familiarize the functions and protocols of the Transport layer.

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

UNIT l: (11 Hours)

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

UNIT II: **(11 Hours)**

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

Data-Link Layer: Introduction-**Link Layer Addressing - Three Types of addresses-**Address Resolution Protocol (ARP).Wired LANS:Ethernet -Ethernet Protocol-**Standard Ethernet.** Wireless LANS: Introduction-IEEE 802.11-Architecture, Bluetooth - Architecture.

UNIT III: **(12 Hours)**

Network Layers: **Network Layer Services-Packet Switching-** Network Layer Performance-IPV4 Addresses: Address Space-Classful Addressing-Classless Addressing- **Forwarding of IP Packets-**Network Layer Protocols: Internet Protocol-Datagram Format- Security of IPv4 Datagrams, ICMP V4-

UNIT IV: **(12 Hours)**

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

UNIT V: **(12 Hours)**

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

Text Book

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

Reference Books

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

Pedagogy

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

Course Designers:

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C09	JAVA PROGRAMMING	Theory	73	2	-	4

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

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of Object Oriented Programming and Java programming structure	K1
CLO2	Understand the usage of programming elements of Java	K2
CLO3	Apply the concepts of Java to create simple applications	K3
CLO4	Construct the Java applications & Applet for real time applications.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus
UNIT I: **(15 Hrs)**
        JAVA Basics: Object Oriented Programming (OOP) Concepts, Features of Java language,Types of Java programs, Java Architecture- literals, integer, floating point, character, string and Boolean literals. Data types, integer, floating point, character and Boolean -variables-structure of a Java program-comments, expression, statement, type conversion, block statement, scope. **Operators - Arithmetic, Bitwise, Relational, Boolean logical and ternary operators, Operator precedence**. Control statements - if…Else, Switch, While, do…while, for, break and continue statements, comma statement.

UNIT II: **(14 Hrs)**
        Arrays: **One dimensional array**, multi-dimensional array, Arrays class.
Classes and Objects: Defining a class, new operator and object, the dot (.) operator- method declaration and calling, constructors, instance variable hiding, method overloading, passing objects and arrays as parameter to methods.

UNIT III: **(14 Hrs)**

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

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

UNIT IV: **(15 Hrs)**

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

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

UNIT V: **(15 Hrs)**

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

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

.**Text Book**

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

Reference Books

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

Pedagogy

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

Course Designers:
1. Mrs. K. Geethalakshmi
2. Mrs. S. Mohana Priya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22CP4	JAVA PROGRAMMING LAB	Practical	-	-	60	3

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

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the logic for the given problem, recognize and understand the syntax and construction JAVA code.	K1
CLO2	Understand and design the classes using string functions & methods.	K2
CLO3	Develop java application programs using packages & collection interfaces.	K3
CLO4	Implement the Applet and Graphics Programme	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

List of Programs

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

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

Course Designers:
1. Mrs. K. Geethalakshmi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22A01	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 OF PUBLICATION
1	Seema Gupta	Digital Marketing	McGraw Hill Education	2nd Edition,2018

Reference Books

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

Pedagogy
- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

1. Mrs. M . Selvanayaki

2. Dr.R.Hepziba Gnanamalar

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CS22A02	M-COMMERCE	Theory	58	2	-	3

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

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

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 C2CEC .**

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 - Mobilecommerce 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 Issuesin M-Commerce payment - **Mobile payment systems** - General analysis of the payment solutions.

Unit – V (11 Hrs)

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

Text Book

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

Reference Books

S.NO	AUTHOR	TITLE OF THEBOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Karabi Bandyopadhya	Mobile Commerce	Prentice Hall India Learning Private Limited	2013
2	Paul May	Mobile Commerce: Opportunities, Applications and Technologies of Wireless Business	Cambridge University Press; 1st Edition,	1st Edition, 2001
3	Norman Sadeh	M-Commerce: Technologies Services, and Business Models	John Wiley & Sons,	2003

Pedagogy
- Lectures, Group discussions, Demonstrations, Case studies

Course Designer
- Ms. P. Parvathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22A03	DIGITAL ELECTRONICS & MICROPROCESSOR	Theory	58	2	-	3

Preamble

● To provide knowledge about the principles and practices of digital electronics and computersystem, programming aspects of microprocessor covering both hardware and software basedon the 8085-microprocessor family.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Acquire the basic knowledge of digital logic circuits, microprocessor and its application to understand about its processes.	K1
CLO2	Understand the working mechanism of various combinational, sequential circuits and their role in the digital system design.	K2
CLO3	Comprehensive understanding of memory and its applications	K2
CLO4	Demonstrate how circuits are works through graphical representation.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Unit I   **(12 Hrs)**

Number System and Codes: Binary Number System -Binary to decimal Conversion-Decimal-to binary Conversion-ASCII Code-**Error Detection and Correction**.

Arithmetic Circuits: Binary Addition-Binary Subtraction-Unsigned Binary Numbers-2's Complement Representation-2's Complement Arithmetic-The Adder-subtracter-**Arithmetic Logic unit- Binary Multiplication and Division.**

UNIT II   **(12 Hrs)**

Digital Logic Units: The Basic Gates-NOT-OR-AND-Universal Logic Gates-NOR,NAND-AND-OR-**Inverter Gates.**

Combinational Logic Circuits: Boolean Laws and Theorems-Sum of Products Method-Truth Table to Karnaugh Map- Don't care Conditions-**Product of sums Method**.

Data Processing circuits: Multiplexers-Demultiplexers-BCD-to-decimal Decoders-**Encoders.**

UNIT III (11 Hrs)

Flip-Flops: RS FLIP FLOPS, Gated FLIP FLOPs -FLIP FLOP Timing-JK Master-slave FLIP FLOPS-**Analysis of Sequential Circuits**-Conversion of FLIP FLOP.

Registers: Types of Registers-Serial In-serial Out - Serial In-parallel Out - Parallel In-serial Out- **Parallel In-parallel Out - Universal Shift Register**.

UNIT IV: (11Hrs.)

Architecture and Organization of Microprocessor 8085: Introduction- Evolution of Microprocessor- Microcomputer System- Microprocessor Operations- Functional Description of 8085- **System Bus of 8085- Pin Description of 8085**.

UNIT V: (12Hrs.)

Instruction Set of 8085 Microprocessor: Introduction- Instruction Format- Addressing Modes of MP 8085- **Timing Effects of Addressing Modes- Instruction Set Classification**.

Interrupts of 8085: Introduction- Interrupt Systems- Types of Interrupts in 8085-Hardware Interrupts of 8085- Software Interrupts of 8085- **Interrupt Related Instructions.**

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Donald P Leach, Albert Paul Malvino, Goutam Saha	Digital Principles and Applications (UNIT I,II &III)	McGraw Hill Education (India) Private Limited.	8th Edition,2019
2	Sunil Mathur &Jeebananda Panda	"Microprocessor and Microcontrollers", (UNIT IV,V)	PHI Learning Pvt. Ltd,	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.Salivahanan, S.Arivazhagan	Digital Circuits and Design	Vikas Publishing house Pvt Ltd..	3rd Edition,2009
2	Debasis Das, Ujjwal Lanjewar	Fundamentals of Digital Electronics & 8086 Microprocessor	UBS Publishers distributors Pvt. Ltd,	1st Edition2020

Pedagogy

● Chalk and Talk, PPT, Demo, Discussion, Quiz, and Assignment, Seminar.

Course Designers:
1. Mrs. S. Mohana Priya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22SBP2	DATA ANALYTICS - R PROGRAMMING LAB	Practical		4	41	3

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

List of Programs

1. Create two vectors. Perform arithmetic addition and sort it in ascending and descending order.
2. Find the Mean, median and Mode for the values given in vector.
3. Write an R program to merge two given lists into one list.
4. Write an R program to find all elements of a given list that are not in another given list.

5. Write an R program to create an ordered factor from data consisting of the names of months.

6. Write an R program to convert a given pH levels of soil to an ordered factor.

7. Write an R program to create inner, outer, left, right join (merge) from given two data frames.

8. Write an R program to save the information of a data frame in a file and display the information of the file.

9. Write an R program to create two 2x3 matrix and add, subtract, multiply and divide the matrixes.

10. Finding the transpose of a matrix by using the t() function and by iterating over each value using Loops

11. Write a program using R bar plot to display maximum temperature in a week

12. Write a R histogram program to plot Maximum Daily Temperature at La Guardia Airport

13. Create a scatter plot and scatter plot matrix on the dataset MT Cars.

14. Write an R program to display the temperature of each month using a boxplot

15. Write an R program to display monthly expenditure in a Pie chart.

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

Course Designers:
1. Mrs. S. Mohana Priya

JOB ORIENTED COURSE

Title: **Amazon Web Services**
Duration: 60 Hrs

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

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

Networking Services : Amazon Virtual Private Cloud (VPC) - Amazon Direct Connect - AWS Elastic Load Balancing (ELB) - Amazon Route 53 - Amazon CloudFront -AWS Web Application Firewall (WAF) **Database Services :** Amazon Relational DatabaseService (RDS) - Amazon DynamoDB - Amazon Redshift - Amazon Aurora

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

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

Title: Cisco Certified Network Associate

Duration: 60 Hrs

Network Devices - Routers - Layer 2 and Layer 3 switches - Next-generation firewalls and IPS - Access points - Controllers (Cisco DNA Center and WLC) – Endpoints –Servers – PoE - Network Topologies – 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

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

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

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

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

Title : Microsoft Power BI

Duration : 60 Hrs

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

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

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

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

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C11	.NET PROGRAMMING	Theory	73	2	-	4

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

.NET PROGRAMMING - AP22C11   **73 Hours**
SYLLABUS

UNIT I: **(14 Hrs)**

Introduction to .Net: .Net Framework – Visual Basic .Net – **Creating windows forms applications** – creating a web forms application – **Data types and variables** – Operators – Conditional Logic.

UNIT II: **(15 Hrs)**

Procedures – Dialog Boxes – Dictionary Object – **Namespaces** – Visual Basic .Net IDE – Controls – **Specific controls-** Irregular forms.

UNIT III: **(15 Hrs)**

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

UNIT IV: **(14 Hrs)**

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

UNIT V: **(15 Hrs)**

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

TEXT BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Bill Evjen, Jason Beres	Visual Basic .Net Programming Bible	Wiley Publishing	1st Edition, 2006

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	David Chappell	Understanding .NET	Pearson Education	1st Edition, 2002
2	Steven Holzner	VB.Net ProgrammingBlack book	Dreamtech	1st Edition, 2005
3	Matt J. Couch	ASP. NET and VB.NET Web programming	Pearson Education	1st Edition,2002

PEDAGOGY

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

COURSE DESIGNERS

Dr.R.Hepziba Gnanamalar

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22C12	DATAMINING TECHNIQUES	Theory	73	2	-	4

Preamble

- To gain knowledge of data mining concepts and techniques in data mining.
- Web mining and open source tools to manipulate data mining applications.
- To provide knowledge on Data warehousing and machine learning applications.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the various mining techniques on complex data objects.	K1
CLO2	Understand the kinds of patterns that can be discovered by association rule mining, classification and clustering.	K2
CLO3	Manipulate data pre-processing, data Warehouse and OLAP technology, data cube technology; mining frequent patterns and association, classification, clustering, and outlier detection.	K3
CLO4	Develop a data mining application for data analysis using various tools.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;
DATAMINING TECHNIQUES - AP22C12   **73 Hours**
SYLLABUS

UNIT I   **(14 Hrs)**

DATA MINING: Introduction-What is Data mining? -Definitions-**KDD vs. Data Mining**-Data Mining Techniques-Issues and challenges in Data mining-**Data mining application areas**.

UNIT II (14 Hrs)

ASSOCIATION RULES: What is an association rule? - Apriori algorithm. Clustering: Introduction-**Clustering paradigms** - partitioning algorithm. Decision trees: Introduction-**What is Decision trees?** -**Tree construction principle**.

UNIT III (15 Hrs)

WEB MINING: Introduction-Web content mining-Web usage mining-**Text mining**-Unstructured text-Episode rule discovery for text-**Hierarchy of categories**-Text clustering.

UNIT IV (15 Hrs)

DATA WAREHOUSING: Introduction: What is a data warehouse? -Definition-Multidimensional Data model-**OLAP Operations**-Warehouse Schema- Data Warehousing Architecture-**Warehouse Server-Metadata**- OLAP Engine- Data Warehouse Backend Process- **Other Features.**

UNIT V (15 Hrs)

The WEKA Machine Learning Workbench: Introduction to WEKA-The Explorer: **Getting started – Case studies in real time implementations -** Exploring Clustering Algorithms: Explanation and Use Cases - Machine Learning Case Studies with Powerful Insights.

TEXTBOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Arun k. Pujari	Data Mining Techniques (Unit I, II, III, IV)	University Press (India) Limited.	3rd Edition, 2013
2	Ian H. Witten &Eibe Frank	Data Mining Practical Machine Learning Tools and Techniques (Unit V)	Morgan Kaufmann Publishers	2nd Edition, 2006

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	K.P.Soman, Shyam Diwaka,K.Ajay	Insight into Data Mining	Prentice Hall ofIndia	1st Edition ,2006
2	Daniel T. Larose	Data Mining Methods & Models	Wiley Student Edition	1st Edition ,2006
3	Alex Berson, StephenJ.Smith	Data warehousing, Data mining and OLAP	Tata McGraw hill publisher	2nd Edition,2022

4	Jiawei Han, Micheline Kamber	Data Mining Concepts and Techniques	Morgan Kaufmam Publishers	2nd Edition ,2002
5	David Hand,Weikki Mannil PadhraicSmyth	Principles of Data Mining	Prentice Hall of India,	1st Edition ,2001

E – Resources (Unit – V):

https://www.mygreatlearning.com/blog/data-mining-tool-weka/

https://www.projectpro.io/article/machine-learning-case-studies/855

https://neptune.ai/blog/clustering-algorithms

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

COURSE DESIGNER
1. Mrs. S.Mohanapriya
2. Mrs. A. Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AI22C10	MACHINE LEARNING	Theory	73	2	-	4

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

MACHINE LEARNING   - AI22C10   **73 Hours**
SYLLABUS

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 SimpleLinear Regression Model – Multiple Linear Regression: Developing Multiple Linear Regression ModelUsing 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 – Clusteringfor Image Segmentation - Clustering for Preprocessing - Clustering for Semi-Supervised Learning – DBSCAN – **Other Clustering Algorithm. Creating Product Segments Using Clustering - Hierarchical Clustering.**

UNIT V: (15 Hrs)

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

TEXT BOOK

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

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Tom M Mitchell	Machine Learning	Tata McGraw-Hill, New Delhi	1st Edition, 2017
2	Anuradha Srinivasa Raghavan, Vincy Joseph	Machine Learning	Wiley India	1st Edition,2019

3	Zsolt Nagy	Artificial Intelligence and Machine Learning Fundamentals	Packt publisher	1st Edition, 2018
4	Dr. S Sridhar, Dr. M Vijayalakshmi	Machine Learning	Oxford University Press	1st Edition ,2021

PEDAGOGY

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

COURSE DESIGNERS

1. Mrs. K.Geethalakshmi

2. Mrs.T.S.Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22E01	COMPUTER GRAPHICS	Theory	73	2	-	4

Preamble

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

Course Learning Outcomes

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

COMPUTER GRAPHICS - AP22E01   **73 Hours**
SYLLABUS

UNIT I: **(14 Hrs)**

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

UNIT II: (15 Hrs)

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

UNIT III: (15 Hrs)

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

UNIT IV: (14 Hrs)

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

UNIT V: (15 Hrs)

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

TEXTBOOK

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

REFERENCE BOOKS

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

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

PEDAGOGY

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

COURSE DESIGNERS

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21E02	PERL PROGRAMMING	Theory	73	2	-	5

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

PERL PROGRAMMING - AP21E02   **73 Hours**

SYLLABUS

UNIT I   **(15 Hrs)**

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

UNIT II   **(14 Hrs)**

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

UNIT III (15 Hrs)

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

UNIT IV (14 Hrs)

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

UNIT V (15 Hrs)

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

TEXTBOOK

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

REFERENCE BOOKS

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

PEDAGOGY

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

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21E03	**CLIENT/SERVER TECHNOLOGY**	Theory	73	2	-	5

Preamble

- The course is designed to develop a basic understanding of how to design a Client Server application.
- This course is to provide students with an overview of the concepts and fundamentals of client/server computing and network operating system.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the importance of client/server components, the role of client and server.	K1
CLO2	Understand the principles behind the client/server technology and its uses.	K2
CLO3	Implement a client-server internet application.	K3
CLO4	Articulate the ability of designing and implementing application and skills to analyze problems and synthesize suitable solutions.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

CLIENT/SERVER TECHNOLOGY - AP21E03   **73 Hours**
SYLLABUS

UNIT-I   **(14 hrs)**

Client/Server Computing – **Advantages of Client / Server Computing** – Technology Revolution – Connectivity – Ways to improve Performance – **How to reduce network Traffic.**

UNIT-II

(15 hrs)

Components of Client/Server Applications – The Client: **Role of a Client** – Client Services – Requestfor Service. Components of Client/Server Applications – The Server: **The Role of a Server** – ServerFunctionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating System.

UNIT-III

(15 hrs)

Components of Client/Server Applications – Connectivity: Open System Interconnect – Communications Interface Technology – Interprocess communication – WAN Technologies.

UNIT-IV

(15 hrs)

Components of Client/Server Applications–Software: **Factors Driving demand for application software development** – Rising Technology Staff costs – Need to improve Technology – Need for Common Interface across Platforms – Client/Server System Development Methodology. Components of Client/Server Applications–Hardware: **Hardware/Network Acquisition** – PC- Level Processing Units – Machintosh, notebooks, Pen – UNIX Workstation – x-terminals – Disk, Tape, Optical Disks,NIC and UPS.

UNIT-V

(14 hrs)

Components of Client/Server applications–Service and Support: System Administration. The Futureof Client/Server Computing: **Enabling Technologies** – Transformational Systems.

TEXT BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Patrick Smith, Steve Guengerich	Client/Server Computing	Prentice Hall of India Private Limited, New Delhi	2nd Edition, 2011

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	EDITION / YEAR OF PUBLICATION
1	Dan Harkey, Jeri Edwards	Client/Server survival Guide	Wiley Computer Publishing	3rd Edition, 2007
2	Kuldeep Singh Kohar	An Introduction To Client Server Computing	Vayu Education of India	1stEdition, 2014
3	Devendra Kumar	Client/Server Computing	Global Academic Publishers & Distributors	2nd Edition,2018

PEDAGOGY

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

COURSE DESIGNER

- Mrs. V.Bharathi

- Ms.A.Deepika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22CP5	.NET PROGRAMMING LAB	Practical	-	-	75	3

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

.NET PROGRAMMING LAB - AP22CP5   **75 hours**

LIST OF PROGRAMS:

- Simple application using web controls in VB .Net

- Windows application using controls structures.

- Creation of menus.

- Mouse events using VB.Net.

- Implementing Message Box and Input Box functions.

- Validation controls in VB .Net

- Web controls in ASP .Net

- Validation control in ASP.Net.

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

PEDAGOGY

- Demonstration of working environment / Tools / Software / Program

COURSE DESIGNERS

1. Dr.R.Hepziba Gnanamalar
2. Mrs.R.K.Swathika

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21SBCE	Coursera - MODERN APPLICATION DEVELOPMENT ON AWS	Theory	45	-	-	3

Coursera - MODERN APPLICATION DEVELOPMENT ON AWS - AP21SBCE

Course Contents   **(45 Hrs)**

S. NO.	COURSE NAME	COURSE LINK
1	AWS Cloud Technical Essentials (16Hrs)	https://www.coursera.org/learn/aws-cloud-technical-essentials?specialization=aws-python-serverless-development.
2	Building Modern Python Applications on AWS (24Hrs)	https://www.coursera.org/learn/building-modern-python-applications- on-aws?specialization=aws-python-serverless-development.
3	AWS DynamoDB Fundamentals (18 Hrs)	https://www.coursera.org/learn/aws-dynamodb-fundamentals?adgroupid=137976342650&adpostion=&campaignid=18216928758&creativeid=630416489407&device=c&devicemodel=&gclid=CjwKCAjw-IWkBhBTEiwA2exyO_4Qtm5em-nJgjQrWKcB79b5fBqYN_zOu9vjzB5VJPAbB3vjRmu-cRoCZVEQAvD_BwE&hide_mobile_promo=&keyword=&matchtype=&network=g&utm_campaign=B2C_INDIA_branded_FTCOF_courseraplus_arte&utm_content=B2C&utm_medium=sem&utm_source=gg

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21SBP3	SBS : III -DATA ANALYTICS –DATA VISUALIZATION TOOLS PRACTICAL	Practical	-	4	41	2

Preamble

- This course is aimed for providing graphical representation for real time data using visualizationtools.
- 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;

SBS : III -DATA ANALYTICS –DATA VISUALIZATION TOOLS PRACTICAL - AP21SBP3   41 Hours

List of Programs

Exercises to be performed using data visualization tool.

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

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers:

1. Mrs. T.S.Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21AC1	ALC: ENTERPRISE RESOURCE PLANNING	Theory	-	-	-	5

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

ALC: ENTERPRISE RESOURCE PLANNING - AP21AC1
SYLLABUS
UNIT I

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

UNIT II:

ERP IMPLEMENTATION: Implementation Life Cycle – Implementation Methodology – HiddenCosts – Organizing Implementation.

UNIT III:

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

UNIT IV:

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

UNIT V:

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

TEXT BOOK

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

REFERENCE BOOKS

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

COURSE DESIGNER

1. Mrs. K.Geethalakshmi
2. Mrs. M.Selvanayaki

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21AC2	ALC: MOBILE EDGE COMPUTING	Theory	-	-	-	5

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

ALC: MOBILE EDGE COMPUTING - AP21AC2

SYLLABUS

UNIT I

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

UNIT II

3 Mobile Edge Caching : Introduction - The Architecture of Mobile Edge Caching - Caching Performance Metrics : Hit Rate Ratio - Content Acquisition Latency - Quality of Experience (QoE) - Caching System Utility Caching Service Design and Data Scheduling Mechanisms : Edge Caching Based on Network Infrastructure Services - Edge Caching Based on D2DServices - Hybrid Service–Enabled Edge Caching - Case Study: Deep Reinforcement Learning–Empowered Social– Aware Edge Caching : System Model - Numerical Results.

UNIT III

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

UNIT IV

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

UNIT V

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

TEXT BOOK:

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

REFERENCE BOOKS

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

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21C13	CLOUD COMPUTING	Theory	73	2	-	4

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

CLOUD COMPUTING - AP21C13   **(73 hours)**

Syllabus

UNIT I: **(14 Hrs)**

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

UNIT II: **(15 Hrs)**

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

UNIT III: **(14 Hrs)**

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

UNIT IV: **(15 Hrs)**

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

UNIT V: **(15 Hrs)**

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

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr.KumarSaurabh	cloud Computing Insights into New-Era Infrastructure	Wiley India Pvt.Ltd	2011

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Anthony T.Velte , Toby J.Velte, Robert Elsenpeter	cloud Computing – A Practical Approach	Tata McGraw-Hill	2010
2	Michael Miller	cloud Computing	Pearson Education	2012
3	A.Srinivasan, J.Suresh	cloud Computing – A Practical Approach for Learning and Implementation	Pearson Education	2014
4	Nick Antonopoulos	cloud Computing	Springer Publications	2010

Pedagogy

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

Course Designers:

1. Mrs. M. Selvanayaki
2. Mrs. T.S. Anushya Devi

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21C14	SOFTWARE PROJECT MANAGEMENT	Theory	73	2	-	4

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

SOFTWARE PROJECT MANAGEMENT – AP21C14   (73 hours)

Syllabus

UNIT I: (14 Hrs)

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

UNIT II: (15 Hrs)

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

UNIT III: (15 Hrs)

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

UNIT IV: (15 Hrs)

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

UNIT V: (14 Hrs)

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

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bob Hughes, Mike Cotterell, Rajib Mall	Software Project Management	Tata McGraw Hill Publications, 5th Edition.	2011

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger S. Pressman	Software Engineering	Tata McGraw Hill Publications, 7th Edition.	2014
2	Richard H. Thayer	Software Engineering and Project Management	Wiley publication, 2nd edition.	2010
3	S.A.M. Rizvi, PankajAgarwal	Principles of Software Project Managemnt	Khanna Book Publishing, Ist Edition	2012
4	Walker Royce	Software Project Management- A Unified Framework	Pearson publication, Ist edition	2002

Pedagogy

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

Note: Flipped mode learning topics are highlighted.Course activity

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

Course Designers

1. Mrs.K.Geethalakshmi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21C15	WEB TECHNOLOGY	THEORY	73	2	-	3

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

WEB TECHNOLOGY -AP21C15 (73 hours)
Syllabus

UNIT I: (14 Hrs)
Fundamentals of HTML:-Understanding Elements: Root Elements-Metadata Elements- Section Elements-Heading Elements. **Describing data types**.

UNIT II: (15 Hrs)
HTML5 and its essentials-Exploring New Features of HTML5-Next Generation of Web Development-**Structuring an HTML Document**-Exploring Editors and Browsers Supported by HTML5-**Creating and Saving an HTML Document**-Validating an HTML Document-Viewing an HTML Document-Hosting Web Pages.

UNIT III: (14 Hrs)

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

UNIT IV: (15 Hrs)

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

UNIT V: (15 Hrs)

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

Text Books:

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

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	AkankshaRastogi	Web Technology	K.Nath& Co Educational Publishers, 1st Edition	2012
2	AnuranjanMisra, Arjun Kumar Singh	Intoduction to Web Technology	Laxmi Publication	2011
3	C.Xavier	World Wide Web Design with HTML	TMH Publishers	2008

Pedagogy:

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

Course Designer:

1. Mrs. R. Jayasree
2. **D**r. L. Sheeba

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21CP6	WEB TECHNOLOGY PROGRAMMING LAB	PRACTICAL	-	-	75	3

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

WEB TECHNOLOGY PROGRAMMING LAB - AP21CP6   (75 hours)

LIST OF PROGRAMS:

- Implementing Background design, Color & Text Tags.

- Implementing Image Tags.

- To display list of items in different styles.

- Implementing Table Tags.

- Demonstrate the usage of inline, internal and external style sheet using CSS.

- Implementing Java Script in HTML

- Hot Text using Hyperlink Tags.

- Implementing Frames and Frame sets.

- Create a form with various fields and appropriate front and validations using any one of the scripting languages.
- Demonstrate JavaScript with POP-UP boxes.
- Create a web page using XML.

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

Course Designers

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

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP21SBP3	SBS : III -DATA ANALYTICS – DATA VISUALIZATION TOOLS	Practical	-	4	41	2

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

Exercises to be performed using data visualization tool.

1. Create a bar chart for the given data

2. Create a pie chart for the given data

3. Create a scatter chart for the given data

4. Create a time series chart for the given data

5. Create a bullet chart for the given data

6. Create a area chart for the given data

7. Create a heat map for the given data

8. Create a geo map for the given data

9. Create a filled map for the given data

10. Create a dashboard and format it

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers:

1. Mrs. T.S.Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN21AC3	ALC - ARTIFICIAL INTELLIGENCE	THEORY	-	-	-	5

Preamble

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

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 AI learning Techniques.	K1
CLO2	Understand the Intelligent behaviour of AI system.	K2
CLO3	Apply the AI algorithm for problem solving	K3
CLO4	Demonstrate the proficiency in applying scientific method to models of Machine Learning.	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

ARTIFICIAL INTELLIGENCE- IN21AC3

UNIT I:

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

UNIT II:

Heuristic Search techniques: Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis.
Knowledge representation issues: Representations and mappings – Approaches to knowledgerepresentation.

UNIT III:

Using predicate logic: Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction.
Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning – Matching – Control Knowledge.

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOK:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Elaine rich, Kevin Knight, Shivashankar B Nair	Artificial Intelligence	Tata McGraw Hill publication 3rd Edition	2017

REFERENCES BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mishra R.B	Artificial Intelligence	Prentice Hall of India	2010
2	Deepak Khemani	A Frist Course in Artificial Intelligence	Mc-Graw Hill Educaion Pvt. Ltd.	2013
3	Stuart Russell	Artificial Intelligence: A Modern Approach	Pearson, 3rd Edition	2013

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP16AC4	**ALC - INTERNET OF THINGS (IOT)**	**THEORY**	-	-	-	5

Preamble

- *To understanding the fundamentals of Internet of Things and to build a small low cost embedded system using Raspberry Pi or equivalent boards*

- *To apply the concept of Internet of Things in the real world scenario*

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 concepts and characteristics of IoT	K1
CLO2	Understand the Use of Devices, methodology and tools in IoT.	K2
CLO3	Examine the applications of embedded systems for conversion, control and automation	K3
CLO4	Apply different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.	K3

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

INTERNET OF THINGS (IOT) – AP16AC4
Syllabus

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

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICA TION
1	ArshdeepBahga, Vijay Madisetti	Internet of Things – A hands-on approach	Universities Press.	2015

Reference Books

AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICAION
Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers	Apress	2014
Francis daCosta	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	1st Edition, Apress Publications	2013
Marco Schwartz	Internet of Things with the Arduino Yun	Packt Publishing	2014