PSGR Krishnammal College for Women

DEPARTMENT OF BCA

CHOICE-BASED CREDIT SYSTEM (CBCS)

&

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

BACHELOR OF COMPUTER APPLICATIONS

2023 – 2026 Batch

PROGRAMME LEARNING OUTCOMES (PLO's)- UG

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

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

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

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

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

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

PROGRAMME SPECIFIC OUTCOMES (PSO's)

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

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

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

PSGR Krishnammal College for Women

Department of BCA

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

Semester	Part	Subject Code	Title of the Course	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2301 A/ HIN2301A / FRE2301A	Language Paper I	Language	4	58	2	3	25	75	100	3
	II	ENG2301A	English Paper I	English	4	58	2	3	25	75	100	3
	III	IN23C01	**Core 1:** Computer Programming	CC	4	58	2	3	25	75	100	3
	III	AP23CP1	**Programming Lab 1:** Computer Programming Lab	CC	3	45	-	3	15	35	50	2
	III	PP22C02	**Core 2:** Computational andAlgorithmic Thinking for Problem Solving	CC	3	45	-	-	100 #	-	100	3
	III	AP23C03	**Core 3:** Operating Systems Fundamentals - Linux	CC	4	58	2	3	25	75	100	3
	III	TH23A25	**Allied A1:** Linear Algebra	GE	6	88	2	3	25	75	100	5
	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100 #	-	100	2
		NME23A1/ NME23B1	Advanced Tamil 1 /Basic Tamil 1	AEC	2	28	2	-				
II	I	TAM2302A/ HIN2302A / FRE2302A	Language Paper II	Language	4	58	2	3	25	75	100	3
	II	ENG2302A	English Paper II	English	4	58	2	3	25	75	100	3
	III	IN23C04	**Core 4:** Computer Programming - **II**	CC	5	73	2	3	25	75	100	3
	III	AP23C05	**Core 5:** Digital Computer Fundamentals	CC	4	58	2	3	25	75	100	3
	III	AP23CP2	**Programming Lab 2:** Computer Programming Lab **-II**	CC	5	75	-	3	15*	35*	50	3
	III	TH23A06	**Allied A2:** Discrete Mathematics	GE	6	88	2	3	25	75	100	5
	IV		Online Course	AEC	-	-	-	-	-	-	-	Grade
	IV	NME23A2/ NME23B2	Advance Tamil II/ Basic Tamil II (outside class hours)	AEC	2	-	-	-	100	-	-	Grade
	V	23PEPS1	Professional English for Physical Sciences	AEC	2	25	5	-	100	-	100#	2
	VI	NM23GAW	General Awareness	AEC	Self Study	-	-	Online Test	100	-	-	Grade

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

only internal assessment

CC : Core Course,
GE : Generic Elective,
AEC : Ability Enhancement Course,
CA : Continuous Assessment,
ESE : End Semester Examination,
AEC: Ability Enhancement Course
SEC : Skill Enhancement Course
ACC – Additional Credit Course,
AECC - Ability Enhancement Compulsory Course
- Self Study

*CA conducted for 25 and converted into 15, ESE conducted for 75 and converted into 35

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

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

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

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

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

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

Advance Learner Courses

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

Evaluation pattern for Gen-AI

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

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

Theory

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

Practical

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

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

RUBRICS Assignment/ Quiz / Seminar

Maximum - 20 Marks (converted to 4 marks)

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

CLASS PARTICIPATION

Maximum - 20 Marks (Converted to 5 marks)

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

MAPPING OF PLOs WITH CLOs

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE- IN23C01					
CLO1	S	S	S	M	S
CLO2	S	S	M	S	M
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S
COURSE – AP23CP1					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	S	S	M
CLO4	S	S	M	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 - AP23C03					
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 – IN23C04					
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 - AP23C05					
CLO1	S	**S**	**S**	**M**	M
CLO2	M	**M**	**S**	**M**	S
CLO3	M	S	S	**S**	M
CLO4	S	S	S	**M**	S

COURSE - AP23CP2					
CLO1	S	**S**	**S**	**M**	M
CLO2	M	**M**	**S**	**M**	S
CLO3	M	S	S	**S**	M
CLO4	S	S	S	**M**	S
COURSE - AP23C06					
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 - AP23C07					
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 - AP23CP3					
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 NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C01	COMPUTER PROGRAMMING	Theory	58	2	-	3

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

COMPUTER PROGRAMMING (IN23C01) – [58 Hrs]

UNIT I (10 Hrs)

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

UNIT II **(12 Hrs)**

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

UNIT III **(12 Hrs)**

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

UNIT IV **(14 Hrs)**

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

UNIT V **(10 Hrs)**

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

Text Books

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

Reference Books

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

Pedagogy

Lectures, Group discussions, Demonstrations

Course Designer

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programming Learning Outcomes

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

S- Strong; M-Medium; L-Low

COMPUTER PROGRAMMING LAB (AP23CP1) – [45 Hrs]

LIST OF EXERCISES

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

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

PEDAGOGY

Demonstration of working environment/Tools/Software/Program

COURSE DESIGNER

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L – Low

COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM-SOLVING (PP22C02)

UNIT I **(7 Hrs)**

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

UNIT II **(8 Hrs)**

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

UNIT III **(10 Hrs)**

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

UNIT IV **(8 Hrs)**

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

UNIT V **(12 Hrs)**

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

TEXTBOOK

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

PEDAGOGY

Lectures, Group discussions, Demonstrations, Case studies

COURSE DESIGNER

Mrs. R. Jayasree

EVALUATION PATTERN

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

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

UNIT I **(12 Hrs)**

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

UNIT II **(12 Hrs)**

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

UNIT III **(11 Hrs)**

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

UNIT IV **(11 Hrs)**

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

UNIT V **(12 Hrs)**

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

Text Books

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

Reference Books

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

Pedagogy:

Lectures, Discussion, Quiz, PPT

Course Designers

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

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

Syllabus

Unit I (14 Hrs)

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

Unit II (14 Hrs)

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

Unit III (15 Hrs)

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

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

Unit IV (15 Hrs)

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

Unit V (15 Hrs)

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

Text Book

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

Reference Books

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

Pedagogy

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

Course Designers

1. Mrs. M. Selvanayaki

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

UNIT I: (11 Hrs)

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

UNIT II: (12 Hrs)

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

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

UNIT III: **(11 Hrs)**

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

UNIT IV: **(12 Hrs)**

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

UNIT V: **(12 Hrs)**

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

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

Text Books

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

Reference Books:

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

Pedagogy

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

Course Designer:

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

LIST OF PROGRAMS

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

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs. M. Selvanayaki

2. Ms. A. Deepika

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

Preamble

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network and various components required to build differentnetworks.
- 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;

COMPUTERNETWORKS - AP23C06 **58 Hours**

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 Switched Networks-Packet Switching: Datagram Networks.

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

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

UNIT III: **(12 Hours)**

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

UNIT IV: **(12 Hours)**

Transport Layer: **Introduction to Transport Layer. Simple Protocol-Stop-and-Wait Protocol-Transport Layer Protocols: Introduction** -User Datagram Protocol- Transmission ControlProtocol-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
AP23C07	DATA STRUCTURES USING PYTHON	Theory	58	2	-	3

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DATA STRUCTURESUSING PYTHON - AP23C07 **58 Hours**

Syllabus

UNIT I: **(12 Hrs)**

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

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

UNIT II: **(12 Hrs)**

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

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

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

UNIT III: **(11 Hrs)**

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

UNIT IV: **(12Hrs)**

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

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

UNIT V: **(11 Hrs)**

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

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

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

Text Books

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

Reference Books

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

Pedagogy

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

Course Designers

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

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

Coursera -

Excel Skills for Data Analytics and Visualization Specialization -AP23SCE1

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

SBS I - Gen-AI - CS23SBGP **44 Hours**

Syllabus

UNIT I: Introduction to Gen AI **(9 Hrs)**

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

Hands-on Activity: Exploring AI Tools

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

UNIT II: Basic AI Concepts (8 Hrs)

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning.

Hands-on Activity: Simple AI Projects

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

UNIT III: AI in Practice (9 Hrs)

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques - Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing.

Hands-on Activity: Text and Image Projects

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

UNIT IV: AI for Productivity and Creativity (9 Hrs)

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

Hands-on Activity: Productivity and Creativity

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

UNIT V: Future of Gen AI and Final Project (9 Hrs)

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

Hands-on Activity: Trends in Gen AI

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

Pedagogy

- Demonstration of AI Tools, Lectures and Case studies.

Course Designers

- Mrs. S. Ponmalar

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

DBMS Lab - AP23CP3 **75 Hours**

LIST OF PROGRAMS

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. Implement Joins Operations and Sub Queries
10. Write PL/SQL program to perform Functions and Procedure
11. Create a Registration form using python programming and MySQL database connectivity
12. Create a Login form using python programming and MySQL database connectivity.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Dr. R. Hepziba Ganamalar

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.