PSGR
Krishnammal College for Women

DEPARTMENT OF COMPUTER SCIENCE

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

BACHELOR OF COMPUTER SCIENCE WITH COGNITIVE SYSTEMS
2023-2026 BATCH

Programme Learning Outcomes

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

PLO1	:	Exhibit in-depth knowledge in the discipline of computer science and skills in providing computerized solution
PLO2	:	Interpret theoretical connections between mind, intelligence, cognition, computation, creativity, information, language, and perception
PLO3	:	Apply cognitive, design thinking and critical problem-solving skills to establish a productive career in industry, research, and academia
PLO4	:	Demonstrate with hands-on experience on current technological tools and effective communicative skills to meet the demands of IT / ITeS / ITIS companies
PLO5	:	Pursue higher studies / employ themselves either as software professionals or entrepreneurs through their technical competencies

Programme Specific Outcomes

The students at the time of graduation will

PSO1	:	Exhibit profound knowledge in cognitive science such as Linguistics, Psychology, Artificial Intelligence and Neuroscience
PSO2	:	Apply skills in the areas like Artificial Intelligence and Machine Learning algorithms, Robotic Process Automation, DevOps Tools, Virtualization and Cloud to design and develop applications

Department of Computer Science
Choice Based Credit System & Learning Outcomes Based Curriculum Framework
Bachelor of Computer Science with Cognitive Systems - 2023 - 2026 Batch

Semester	Part	Subject Code	Title of Paper	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2301A/ HIN2301A / FRE2301A	Language I	Language	4	58	2	3	25	75	100	3
I	II	ENG2301A	English Paper I	English	4	58	2	3	25	75	100	3
I	III	CG23C01	**Core 1:** Operating Systems	CC	4	58	2	3	25	75	100	3
I	III	CG23CP1	**Programming Lab 1:** Operating Systems Lab	CC	4	60	-	3	15	35	50	2
I	III	PP22C02	**Core 2:** Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100	-	100	3
I	III	CG23CP2	**Programming Lab 2:** Worksheets Lab	CC	3	45	-	3	15	35	50	2
I	III	TH23A03	**Allied A1:** Numerical and Statistical Techniques	GE	6	88	2	3	25	75	100	5
I	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	2
		NME23A1/ NME23B1	Advance Tamil / Basic Tamil			28	2	-				
II	I	TAM2302A/ HIN2302A / FRE2302A	Language II	Language	4	58	2	3	25	75	100	3
II	II	ENG2302A	English Paper II	English	4	58	2	3	25	75	100	3
II	III	CG23C03	**Core 3**: Computer Networks	CC	4	58	2	3	25	75	100	3
II	III	CG23C04	**Core 4:** Computer organization and architecture	CC	3	43	2	3	25	75	100	2
II	III	CG23CP3	**Programming Lab 3:** Computer Networks Lab	CC	3	45	-	3	15*	35*	50	2
II	III	CG23CP4	**Programming Lab 4:** Web technology lab	CC	4	60	-	3	15*	35*	50	2
II	III	TH23A06	**Allied A2** Discrete Mathematics	GE	6	88	2	3	25	75	100	5
II	IV		**Online Course**	AEC	-	-	-	-	-	-	-	Gr
		NME23A2/ NME23B2	** Advanced Tamil II / Basic Tamil II	AEC	2	-	-	-	100	-	100	Gr
II	V	23PEPS1	Professional English for Physical Sciences	AEC	2	25	5	-	100	-	100	2

II	VI	NM23GAW	General Awareness	AEC	Self-Study	-	-	OT	100	-	-	Gr
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	CG23C05	**Core 5:** Virtualization and Cloud	CC	4	58	2	3	25	75	100	3
III	III	CG23C06	**Core 6:** Infrastructure Management	CC	4	58	2	3	25	75	100	3
III / IV	III	CG23SCE1 / CS23SBP1	**Coursera:** DevOps Tools /**SBS I** –Gen - AI	SEC	3	45/44	-/1	-	100	-	$50^{\wedge}$	2
III	III	TH23A13	**Allied A3:** Optimization Techniques	GE	4	58	2	3	25	75	100	3
III	III	CG23CP5	**Programming Lab 5:** Virtualization and Cloud Lab	CC	2	30	-	3	15*	35*	50	3
III	III	CG23CP6	**Programming Lab 6:** Python Programming Lab	CC	3	45	-	3	15*	35*	50	2
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 services/ Cisco Certified Network Associate/ Microsoft windows server administration/ Microsoft Power BI	-	-	-	-	-	-	-	-	-
I -IV	VI	COM15SER	Community Service 30 Hrs	GC	-	-	-	-	-	-	-	-
IV	I	TAM2304A/ HIN2304A / FRE2304A	Tamil Paper IV / Hindi Paper IV / French Paper IV	L	4	58	2	3	25	75	100	3
IV	II	ENG2304A	English Paper IV	E	4	58	2	3	25	75	100	3
IV	III	CG23C07	Software Process Management	CC	4	58	2	3	25	75	100	3
IV	III	CG23C08	Java Programming	CC	3	43	2	3	25	75	100	3
IV	III	CG23CP7	Java Programming Lab	CC	3	45	-	3	15*	35*	50	3
IV	III	CG23CP8	DBMS Lab	CC	3	45	-	3	15*	35*	50	3
III / IV	III	CG23SCE1 / CS23SBP1	DevOps Tools / Gen - AI	SEC	3	45	-	-	100	-	$50^{\#}$	2

IV	III	CG23A01 / CG23A02	Cognition and Problem Solving / Embedded Systems and Communication Technologies	GE	4	58	2	3	25	75	100	3
IV	IV	NM23EII	Entrepreneurship and Innovation (Ignite X)	AECC	2	30	-	-	100	-	100	2
IV	IV	NM23EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr
IV	V	COCOACT	Co-Curricular Activities	GC	-	-	-	-	100	-	100	1
I -IV	VI	COM15SER	Community Service 30 Hours	GC	-	-	-	-	-	-	-	-
I - V	VI	16BONL1 16BONL2	Online Course - I Online Course - II	ACC	-	-	-	-	-	-	-	-

**Outside the regular classes

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

^100 Marks Converted into 50 Marks (Both SBS & Coursera)

#Self study

L	:	Language	AEC	:	Ability Enhancement Course
E	:	English	AECC	:	Ability Enhancement Compulsory Course
CC	:	Core Course	CA	:	Continuous Assessment
SEC	:	Skill Enhancement Course	ESE	:	End Semester Examination
GE	:	Generic Elective	Gr	:	Grade

Mapping of PLOs with CLOs

COURSE 1 - CG23C01

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

COURSE 2 - CG23CP1

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

COURSE 3 - PP22C02

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

COURSE 4 - CG23CP2

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

COURSE 5 - CG23C03

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

COURSE 6 - CG23C04

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

COURSE 7 - CG23CP3

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	S	S	S	M	S

COURSE 8 - CG23CP4

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

COURSE 9 - CG23C05

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

COURSE 10 - CG23C06

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	M	S	S	S

COURSE 11 - CG23CP5

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

COURSE 12 - CG23CP6

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

COURSE 12 - CG23C07

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

COURSE 13 - CG23C08

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

COURSE 14 - CG23CP7

CLOs	PLO1	PLO2	PLO3	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

COURSE 15 - CG23CP8

CLOs	PLO1	PLO2	PLO3	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

COURSE 16 - CG23A01

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

COURSE 17 - CG23A02

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

Evaluation Pattern 23-24 Batch onwards

CA Question Paper Pattern and distribution of marks
UG Language and English

Section A	5 x 1 (No choice)	:	5 Marks
Section B	4 x 5 (4 out of 6)	:	20 Marks (250 words)
Section C	2 x 10 (2 out of 3)	:	20 Marks (500 words)
	Total :		**45 Marks**

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

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

One question with a weightage of 5 Marks (Internal Choice at the same CLO level):5 x 3 =15

One question with a weightage of 8 Marks (Internal Choice at the same CLO level):8 x 3 =24

Total: 45 Marks

ALC

Section A (Paragraph answer) (4 out of 6) 4 x 4	:	16
Marks Section B (Essay type) 1 out of 2	:	9 Marks
Total	**:**	**25 Marks**

End Semester Examination – Question Paper Pattern and Distribution of Marks Language and English – UG

Section A 10 x 1 (10 out of 12)	:	10 Marks
Section B 5 x 5 (5 out of 7)	:	25 Marks (250 words)
Section A 4 x 10 (4 out of 6)	:	40 Marks (600 - 700 words)
Total	**:**	**75 Marks**

UG & PG - Core and Allied courses:

ESE Question Paper Pattern: 5 x 15 = 75 Marks

Question from each unit comprising of

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

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

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

ESE Question Paper Pattern:(for Accounts Paper) 5 x 15 = 75 Marks
Question from each unit comprising of

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

One question with a weightage of 5 Marks : 5 x 5 =25

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

End Semester for UG / PG - Advance Learner Courses

Section A 5 questions out of 8 - open choice 5x5 :25 marks
Section B 5 questions out of 8-open choice 5x10 :50 marks
Total :75 marks

Continuous Internal
Assessment Pattern Theory
I Year UG / PG (23 Batch)

CIA Test	:	5 marks **(conducted for 45 marks after 50 days)**
Model Exam	:	7 marks **(Conducted for 75 marks after 85 days (Each Unit 15 Marks))**
Seminar/Assignment/Quiz	:	5 marks Class
Participation	:	5 marks
Attendance	:	3 marks
Total	**:**	**25 Marks**

Practical

Lab Performance	:	7 marks
Regularity	:	5 marks
Model Exam	:	10 marks
Attendance	:	3 marks
Total	**:**	**25 marks**

ESE Practical Pattern

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

Project:

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

I	Review	- Selection of the field of study, Topic & literature collection	:	5 Marks
II	Review	Research Design	: & Data Collection	10 Marks
III	Review	Analysis & Conclusion draft	: Preparation of rough	10 Marks
			Total:	**25 Marks**

End semester examination:

Evaluation of the project	:	25 Marks
Viva Voce	:	50 Marks
Total	**:**	**75 Marks**

Part IV

<u>Introduction to Entrepreneurship / Women Studies / Value education / Environmental Studies / Design Thinking</u>

Quiz	:	50 marks
Assignment	:	25marks
Project / Case study	:	25 marks
Total	**:**	**100 Marks**

<u>Professional English</u>

The course offered in alignment with TANSCHE norms with 2 credits. Quiz (5 x 20 Marks) : 100 Marks

<u>Cyber Security I & II</u>

Quiz	:	60 Marks
Case Study	:	20 Marks
Poster	:	20 Marks

Course Number	Course Name	Category	L	T	P	Credit
CG23C01	**Operating Systems**	**Theory**	**58**	**2**	**-**	**3**

Preamble

The objective of the course is to provide knowledge on the functionalities of the client and server operating system. It will enable the students to install, configure, deploy, manage, and maintain the operating system. 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 functionalities of client and server operating systems and industry 4.0 technologies	K1
CLO2	Understand the steps to install, configure and deploy the windows server operating system	K2
CLO3	Illustrate the steps in managing and maintaining windows server operating system	K3
CLO4	Demonstrate the steps to implement, manage and maintain Group Policy, Disk Partitioning, File Management, DHCP, DNS and analyze various Industry 4.0 technologies and automation processes in different domains	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L - Low

Operating Systems - CG23C01 **(58Hrs)**

Syllabus

Unit I **11 Hrs**

Operating System Overview - Hardware Basics - **Windows 10: Installing, Configuring and Deploying Windows 10** - System Maintenance: Hardware - Managing Disks and Drives - Automating Tasks and Activities.

Unit II **12Hrs**

Windows Server 2016 - Overview - Working with Windows Servers - Preparing Networking -Navigating Management Options - Managing Servers Remotely - **Managing Roles and Features**.

Unit III **12Hrs**

Configuring Server Settings: **Server Naming** - Managing Processor Scheduling - Allocating Virtual Memory - **Active Directory** - Understanding - Managing - Maintaining - ADFS - FSMO Roles -Backup and Storage.

Unit IV **13 Hrs**

Deploying Windows Server 2016 - Preparing - **Managing Disk Partitions** - Implementing TCP/IP networking - Data storage - Partitioning and Optimizing Drives - **RAID** - Implementing File Sharing - Managing Permissions and Auditing. Group Policy Management - Group Policy for Administration - Print Services - **DHCP: Implementing, Managing and Maintaining - DNS: Implementing, Managing and Maintaining.**

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	Bott, Ed, and Craig Stinson	Windows 10 Inside Out (Unit I)	Microsoft Press	2016
2	William R Stanek	Windows Server 2016: The Administrator's Reference (Unit II, III, IV)	Create Space Independent Pub	2016
3	P. Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0 (Unit V)	CRC Press – Taylor and Francis Group	2020

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Svidergol. B Meloski.V, Wright . B, Martinez . S &Bassett . D	Mastering Windows Server 2016	John Wiley & Sons	2018
2	Orin Thomas	Windows server 2016 Inside out	Pearson Education	2017

Web resources

- https://docs.microsoft.com/en-us/troubleshoot/windows-server

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Designers

- Dr. S. Karpagavalli

Course Number	Course Name	Category	L	T	P	Credit
CG23CP1	**Operating Systems Lab**	**Practical**	**-**	**-**	**60**	**2**

Preamble

The objective of this lab course is to provide the complete knowledge of installation of client / server windows in virtual machine. It will equip the students to perform partitioning management operations, sharing resources and configure network features in the operating system.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding the installation of client / server windows in virtual machine and naming the system	K2
CLO2	Illustrate adding roles and features in OS server	K3
CLO3	Demonstrate disk partitioning and replication operations in server	K3
CLO4	Analyze the working of active directory domain service, installation of DNS and DHCP	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	S
CLO4	S	S	S	S	S

S - Strong; M - Medium; L - Low

Operating Systems Lab - CG23CP1 **(60Hrs)**

List of Programs

- Install client Windows 10 in virtual machine and naming the system
- Install Windows server 2016 in virtual machine as an administrator
- Managing roles and features of Windows server 2016
- Disk partitioning in MBR and GPT and creating new volume in disk
- Configure and install Active Directory Domain Service
- Promote the active directory server to domain controller and replication of Windows server
- Implementing group policy for administration in Windows server 2016

- Configuring, managing and installation of DNS in Windows server 2016
- Configuring, managing and installation of DHCP in Windows server 2016
- Configuration and deployment of IIS in Windows server 2016
- Mapping network drive for file sharing and printer sharing

Pedagogy

- Demonstration of working environment / Software

Course Designers

- Mrs. D. Suganthi

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 behaviour that draws on concepts fundamental to computer science.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the basic principles of logical reasoning, problem solving in computational thinking	K1
CLO2	Understanding the applications of propositional logic, problem representation and techniques	K2
CLO3	Apply algorithmic thinking to problem solving using tools	K3
CLO4	Apply and analyze to solve domain specific problems using computational thinking concepts	K4

MappingwithProgrammeLearning Outcomes

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

S-Strong; M-Medium; L- Low

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

Syllabus

Unit I **7 Hrs**

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

Unit II **8 Hrs**

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

Unit III **10 Hrs**

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

Unit IV **8Hrs**

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

Unit V **12Hrs**

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, FabrizioLuccio	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

- Dr. M. Sowmya

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
CG23CP2	**Problem Solving using Worksheets Lab**	**Practical**	**-**	**-**	**45**	**2**

Preamble

The objective of the lab course is to provide the necessary skills to work with worksheets to automate tasks using VBA code.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Knowledge on working with cell, range, worksheet, and workbook	K1
CLO2	Explore the simple programs to perform automation tasks	K2
CLO3	Design forms using ActiveX controls	K3
CLO4	Create charts for data and import / export data from different applications	K4

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

Problem Solving using Worksheets Lab - CG23CP2 **(45Hrs)**

List of Programs

- Working with cells, range, worksheets, and workbooks
- Basic mathematical expressions
- Objects, properties, methods, and events.
- Interactive Input/Output, accessing excel formulas using VBA
- Working with simple macros using sequence, selection and repetition
- VBA procedures for data analysis (filter/sorting/removing duplicates)
- Simple macros using string functions
- Simple macros using date functions.
- Simple macros using user-defined functions
- Error handling in VBA
- Data visualization through charts and graphs

- Consolidating multiple sheet
- Import / export data from different applications
- Creating user forms using ActiveX controls
- VBA programs to work with files /folders

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

- Dr. S. Karpagavalli
- Dr. M. Sowmya

Course Number	Course Name	Category	L	T	P	Credit
CG23C03	**Computer Networks**	Theory	58	2	-	3

Preamble

This course is designed to provide knowledge on network, OSI reference model, IP address, routers, switches, various network protocols and network security.

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 network terminologies, hardware, architectures and security	K1
CLO2	Understand various reference models, protocols, subnetting and security methods	K2
CLO3	Demonstrate the working of different networks and protocols	K3
CLO4	Analyze the characteristics of networks, routing protocols and security techniques	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L - Low

Computer Networks - CG23C03 **(58 Hrs)**

Syllabus

Unit I **11 Hrs**

Introducing Computer Networks - Purpose of Networks - Operation Flow of Computer Networks - **Topologies of Computer Networks** - The OSI Reference Model: Introduction to the OSI Reference Model - **Seven Layers** - **Benefits of the OSI Reference Model** - Introduction the TCP/IP Protocol Suite.

Unit II **12 Hrs**

IP Addressing: The Purpose of IP addresses - **The Hierarchy of IP Addresses** - Subnetting: Subnetting Basics - IP Address Class and Subnet Mask - Variable Length Subnet - Switches: **Purpose of switches - Switch functions** - Connecting to Cisco Switch - Configuring Cisco Switch - Managing Cisco Switch Authentication.

Unit III **11 Hrs**

Spanning Tree Protocol - Introducing the Spanning Tree Protocol - **STP Operation Flow** - Introducing Cisco Options for STP - Introducing Rapid Spanning Tree Protocol - Ether Channel - Monitoring STP - Virtual Local Area Networks - **Introducing Virtual Local Area Networks-Benefits of VLANs - Managing VLANs** - VLAN Trunking - VLAN Trunking Protocol.

Unit IV **12 Hrs**

Network Routing - Introducing Network Routes - Routing Protocols - Routed Protocols - Routing Decision Protocols - **Routing Decision Criteria - Routing Methods** - Routing Information Protocol - Introducing Routing Information Protocol - Enhanced Interior Gateway Routing Protocol - IGRP - The Foundation of EIGRP - EIGRP Benefits - Characteristics of EIGRP - EIGRP Operation - Open Shortest Path First Protocol - Introducing Open Shortest Path First - OSPF Routing Hierarchy.

Unit V **12 Hrs**

Network Security Basics: Network Zoning - Recognizing Security Risks - Introducing Security Risk Mitigation Methods - IP Access Lists - **Purpose of Access Lists - Types of Access Control Lists (ACLs)** - Managing ACLs-Creating ACLs - Network Address Translation (NAT) - Purpose of NAT - Operational Flow of NAT.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	SilviuAngelescu	CCNA Certification All-in - One For Dummies	For Dummies	2010

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Behrouz A. Forouzan	Data Communications and Networking	Tata McGraw Hill	5th Edition, 2017
2	Kurose James F. Ross Keith W.	Computer Networking - A Top-Down Approach	Pearson Education	6th Edition, 2017
3	William Stallings	Data and Computer Communications	Pearson Education	10th Edition, 2017

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designers

- Dr. S. Karpagavalli
- Ms. P. Parvathi

Course Number	Course Name	Category	L	T	P	Credit
CG23C04	**Computer Organization and Architecture**	**Theory**	**43**	**2**	**-**	**2**

Preamble

This course provides the principles and practices of digital electronics and computer system. It covers data transfer techniques, computer arithmetic operations, I/O and memory organization.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand number systems, conversions, boolean algebra and karnaugh map	K1
CLO2	Differentiate the functioning of flip-flops, multiplexer and decoder	K2
CLO3	Illustrate the concepts of register transfer, micro operation, arithmetic operations, addressing modes and instruction format	K3
CLO4	Analyze various I/O and memory organizations	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L- Low

Computer Organization and Architecture - CG23C04 **(43 Hrs)**

Syllabus

Unit I **9 Hrs**

Data Representation: Data Types - Number Systems: **Octal & Hexadecimal Numbers, Decimal Representation, Alphanumeric Representation.** Logic Circuits: Gates - AND, OR, NOT, NAND, NOR Gates and Truth Tables - Boolean Algebra.

Unit II **9 Hrs**

Flip Flops: SR, JK, D, T Flip Flops. Karnaugh Maps - Product of Sums Method - Sum of Products Method- **Don't Care Condition - Decoders-Multiplexer -Demultiplexer.**

Unit III **9 Hrs**

Register Transfer and Micro Operations: Register Transfer Language - Register Transfer-Bus and Memory Transfers - **Arithmetic Micro Operations-Logic Micro Operations - Shift Micro Operation.** Instruction Format: Three Address Instruction-Two Address Instruction-One Address Instruction-Zero Address Instruction.

Unit IV **8 Hrs**

Input / Output Organization: Input Output Interface - Asynchronous Data Transfer - DMA. Memory Organization: Memory Hierarchy - **Main Memory - Cache Memory - Virtual Memory-** Associative memory.

Unit V **8 Hrs**

Case study: 32bit /64bit processor architecture, Next generation computer architecture: **Introduction to Graphics Processing Units (GPU) -CPU and GPU difference** - Quantum Computers – Neuromorphic chips.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	M Morris Mano	Computer System Architecture	Pearson Education	3rd Edition, 2017
2	Jim Ledin	Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers	Packt Publishing Limited	1st Edition, 2020

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Yale N. Patt& Sanjay Patel	Introduction to Computing Systems: From Bits and Gates to C and Beyond	McGraw-Hill Education	3rd Edition, 2019
2	John .L. Hennessy	Computer Architecture - A Quantitative approach	Elsevier	6thEdition, 2018
3	William Stallings	Computer Organization & Architecture	Pearson Education	11th Edition,2022

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

Dr. M. Sowmya

Course Number	Course Name	Category	L	T	P	Credit
CG23CP3	**Computer Networks Lab**	Practical	-	-	45	2

Preamble

This course imparts a detailed knowledge on designing the structure and topology of different types of networks and on configuring different routing protocols.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Design and setup different topology of network	K1
CLO2	Understand the concept of IP address, switches and routers	K2
CLO3	Apply VLAN and VLAN trunk protocol to connect different networks	K3
CLO4	Implement and configure different types of routing protocols in any one topology	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	S	S	S	M	S

S - Strong; M - Medium; L - Low

Computer Networks Lab - CG23CP03 **(45 Hrs)**

List of Programs

- Topology of network
- Working with IP address, switches and routers
- Static routing protocol
- Routing information protocol
- Virtual local area network
- VLAN trunking protocol
- Spanning tree protocol
- Enhanced interior gateway routing protocol
- Open shortest path first protocol
- Dynamic host configuration protocol
- Telnet
- Point to point with password authentication protocol

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designers

Ms. P. Parvathi

Course Number	Course Name	Category	L	T	P	Credit
CG23CP4	**Web Technologies Lab**	Practical	-	-	60	2

Preamble

This lab course introduces HTML5 tags, Cascading Style Sheets for web programming. It helps to explore client side scripting language and working with content management systems.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the purpose of HTML5 tags	K1
CLO2	Apply CSS for effective design of web pages	K2
CLO3	Demonstrate the power of scripting language in web development	K3
CLO4	Design and develop dynamic web pages, websites and blogs	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium; L - Low

Web Technologies Lab - CG23CP4 **(60 Hrs)**

List of Programs

- Formatting Tag, List Tags
- Image and Anchor Tag, BG Color, Font
- Table Tags
- Frames and Frame sets
- Cascading Style Sheets - Internal, External, Inline
- Radio buttons, Check boxes and List boxes
- Validation using script
- Calculation using script
- Data binding using script
- Content management system

- Design and development of simple web site / blog

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

- Mrs. S. Ponmalar

Course Number	Course Name	Category	L	T	P	Credit
CG23C05	**Virtualization and Cloud**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course provides an insight on virtualization, cloud services and data centers. It also emphasizes on various cloud service providers, cloud deployment models and hypervisors.

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 cloud, essentials of virtualization and data centers	K1
CLO2	Understand the cloud services, service models and virtualization types	K2
CLO3	Apply cloud services and virtualization for effective use of resources	K3
CLO4	Analyze different cloud services, security threats, virtualization and data centers for various business categories	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

Virtualization and Cloud - CG23C05 **(58 Hrs)**

Syllabus

Unit I **12Hrs**

Computing Paradigms - **Cloud Computing Fundamentals**: Motivation for Cloud Computing- Principles of Cloud computing- Requirements for Cloud Services **- Benefits and Drawbacks**. Cloud Computing Architecture and Management: Introduction – **Cloud - Applications on the Cloud - Managing the Cloud** - Migrating Application to Cloud.

Unit II **12 Hrs**

Cloud Deployment Models: Introduction - Private Cloud - Public Cloud - Community Cloud - Hybrid Cloud. **Cloud Service Models: Introduction** - Infrastructure as a Service - Platform as a Service - Software as a Service - Other Cloud Service Models.

Unit III **12Hrs**

Virtualization: Introduction - Virtualization Opportunities - Approaches to Virtualization - **Hypervisors** - Virtualization to Cloud Computing. Security in Cloud Computing: Introduction- Security Aspects- Platform-Related Security - **Audit and Compliance**.

Unit IV **11 Hrs**

Cloud Service Providers: Introduction - EMC - **Google** - Sales force - **Amazon Web Services: S3 - EBS - EC2** -Dynamo DB - **Microsoft - IBM**

Unit V **11 Hrs**

Data Centers: Overview of data centers -Data center goals - **Data center facilities** -Role of data centers in the enterprise - Role of data centers in the service provider environment - Application architecture models - **Data center architecture** -Data center services.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	K. Chandrasekaran	Essentials of Cloud Computing (Unit I, II, III & IV)	CRC Press	2015, 1st Edition
2	Mauricio Arregoces, MaurizioPortolani	Data Center Fundamentals (Unit V)	Cisco press	2003, 1st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Ray Rafaels	Cloud Computing	Create Space Independent Publishing Platform	2018, 2nd Edition
2	Curtis Franklin Jr. and Brian Chee	Securing the Cloud: Security Strategies for the Ubiquitous Data Center	Auerbach Publications	2019, 1st Edition
3	Dinseh G. Dutt	Cloud Native Data Center Networking: Architecture, Protocols, and Tools	O'Reilly Media	2019, 1st Edition

Note:

- Blended mode topics are highlighted. Links will be provided.

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designers

- Dr. J. Viji Gripsy

Course Number	Course Name	Category	L	T	P	Credit
CG23C06	**Infrastructure Management**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course provides fundamental knowledge on system center configuration manager, system center operation manager, a single tool to manage all client environments.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the primary configuration management features of SCCM and SCOM	K1
CLO2	Understand the components of SCCM and SCOM to create, manage, deploy and monitor applications	K2
CLO3	Apply configuration manager and operation manager to manage and monitor enterprise infrastructure	K3
CLO4	Analyze enterprise infrastructure management applications using SCCM and SCOM	K4

Mapping with ProgrammeLearning 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	M	S	S	S

S- Strong; M-Medium.

Infrastructure Management - CG23C06 (58 Hrs)

Unit I 12Hrs

Implementing Windows 10: User interface - **Switching between desktop mode and tablet mode - Using virtual desktops - Using snap – Cortana** - Windows startup enhancements - Microsoft Edge – Security - Windows 10 upgrade process. Windows 10 deployment options: **Pre-deployments steps - Manual in-place upgrade- Traditional deployments- Windows update approach- OS upgrade via windows server update services.**

Unit II 12 Hrs

Configuration Management Basics: Ten Reasons to Use Configuration Manager - The Evolution of Systems Management - Systems Management Defined - Microsoft's Strategy for Service Management - Overview of Microsoft System Center - The Value Proposition of Configuration Manager. **Looking Inside Configuration Manager: Design Concepts - Active Directory Integration - A WMI Primer - WMI in ConfigMgr - Components and Communications - Inside the ConfigMgr Database - Viewing Detailed Process Activity- SQL Replication Crash Course - Configuration Manager Database Replication - File-Based Replication.**

Unit III 12 Hrs

Installing System Center 2012 Configuration Manager: Configuring Pre-Installation Requirements - Performing Site Installations - Site Properties - Uninstalling Sites -

Troubleshooting Site Installation The Configuration Manager Console: Console Highlights - Touring the Console - ConfigMgr Workspaces - Console Deployment - Role-Based Administration - Connecting to a Site - The In-Console Alert Experience - Configuration Manager Service Manager - Security Considerations - Troubleshooting Console Issues.

Unit IV **11 Hrs**

Creating and Managing Applications :ConfigMgr Applications Overview - **About Creating Applications - Creating Deployment Types - Creating Detection Methods - Managing and Creating Global Conditions Configuration Manager Queries:** Introducing the Queries Node - Creating Queries - ConfigMgr Query Builder - Criterion Types, Operators, and Values - Writing Advanced Queries - Relationships, Operations, and Joins - **Using Query Results - Status Message Queries.**

Unit V **11 Hrs**

Software Update Management: New in 2012 - Incorporated tools - Preparing for software updates with ConfigMgr - Software update building blocks - **The software updates process in action. Backup, Recovery, and Maintenance : Performing Site and SQL Server Backups - SQL Replication - Site Maintenance - Database Maintenance -** Making the Status Message System to Work - Monitoring Configuration Manager with Operations Manager - Services and Descriptions.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Kerrie Meyler, Byron Holt Marcus Oh Jason Sandys Greg Ramsey	System Center 2012 Configuration Manager Unleashed	Pearson Education	2013, 1st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Santos Martinez , Peter Daalmans , Brett Bennett	Mastering System Center 2012 R2 Configuration Manager	Sybex	2017, 1st Edition
2	Samir Hammoudi, ChuluunsurenDamdinsuren , Brian Mason &Greg Ramsey	Microsoft System Center Configuration Manager Cookbook	Packt Publishing	2016, 2nd Edition

Web Resources

- https://www.prajwaldesai.com/sccm-console-deployment/
- https://www.anoopcnair.com/sccm-admin-web-console-softwarecentral-review/

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designers

- Mrs. J. Mythili

Course Number	Course Name	Category	L	T	P	Credit
CG23SCE1	**Coursera - DevOps Tools**	**Theory**	**-**	**-**	**-**	2

Course Contents **(45 Hrs)**

- AWS Cloud Technical Essentials (20Hrs)
- DevOps on AWS: Code, Build, and Test (8 Hrs)
- DevOps on AWS: Release and Deploy (7 Hrs)
- DevOps on AWS: Operate and Monitor (10 Hrs)

Course Number	Course Name	Category	L	T	P	Credit
CS23SBP1	**SBS I - Gen-AI**	**Practical**	**-**	**1**	**44**	**2**

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5
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 - CS23SBP1 **(45 Hrs)**

Unit 1: Introduction to Gen AI **(9 hours)**

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

Hands-on Activity: Exploring AI Tools

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

Unit 2: Basic AI Concepts (8 hours)

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

Hands-on Activity: Simple AI Projects

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

Unit 3: AI in Practice (9 hours)

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

Hands-on Activity: Text and Image Projects

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

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

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

Hands-on Activity: Productivity and Creativity

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

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

Emerging Trends in Gen AI - Applications of Generative AI - Ethical andSocietal 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.

Pedagogy

Demonstration of AI Tools, Lectures and Case studies.

Course Designer

Mrs. S. Ponmalar

Evaluation pattern for Gen-AI

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

Course Number	Course Name	Category	L	T	P	Credit
CG23CP5	Virtualization and Cloud Lab	Practical	-	-	30	3

Preamble

This course provides technical skills on virtualization, creating virtual machines and the environment. It also enables the students to explore cloud services.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding implementation of virtual machines	K1
CLO2	Demonstrate the key technologies required for setting up IT virtualization and cloud computing infrastructure and private cloud platform using virtualization	K2
CLO3	Apply the key components of Amazon Web Services in problem solving	K3
CLO4	Demonstrate cloud services and cloud programming	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	S
CLO4	M	S	M	S	S

S- Strong; M-Medium.

Virtualization and Cloud Lab - CG23CP5 **(30 Hrs)**

List of Programs

- Working with hypervisors
- Creating Virtual Machines
- Cloning Virtual Machines
- Network Virtualization
- SAAS Services
- Creating Private Cloud
- Creating account in AWS
- Exploring AWS services like EC2, S3, Buckets
- Exploring Salesforce

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

- Dr. J. Viji Gripsy

Course Number	Course Name	Category	L	T	P	Credit
CG23CP6	Python Programming Lab	Practical	-	-	45	2

Preamble

This course provides hands-on experience of python programming and to solve problems using python API's.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand python programming structure	K1
CLO2	Classify different functions in python programming	K2
CLO3	Apply files for data processing	K3
CLO4	Illustrate pattern matching and extra action using regular expression and database connectivity	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

Python Programming Lab - CG23CP6

(45Hrs)

List of Programs

- Exercises to write, test, and debug simple python programs
- Exercises using variables and expressions
- Exercises to explore assignments, conditional and loop statements
- Exercises using functions and iterations
- Exercises using data structures like lists, dictionaries and tuples
- Exercises to do pattern matching using regular expressions
- Exercises using classes and objects
- Exercises to read and write data in files
- Exercises to store, retrieve and access data from data source

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designer

- Mrs. D. Suganthi

.

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 Route53- Amazon Cloud Front- AWS Web Application Firewall (WAF) **Database Services:** Amazon Relational Database Service (RDS) –Amazon DynamoDB -Amazon Redshift –Amazon Aurora

Security & Identity Services: Amazon Identity and Access Management (IAM) - Amazon Cognito -AWS Certificate Manager -AWS Key Management Service (KMS) – Amazon Cloud HSM AWS Shield Management & Developer Tools- AWS Cloud Formation – AWS Cloud Trail-AWS Command Line Interface (CLI)-AWS Systems Manager-AWS Code Commit - AWS Code Build - AWS Code Deploy - AWS Code Pipeline Amazon Kinesis –Amazon EMR –Amazon Athena -Amazon Redshift- Amazon Quick Sight

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

Title : Cisco Certified Network Associate
Duration : 60 Hours

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, andmitigation - 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 Hours**

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

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

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

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

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

Course Code	Course Name	Category	L	T	P	Credit
CG23C07	**Software Process Management**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course introduces the concepts of software process models, agile project management using Scrum and Lean. It also introduces DevOps tools in software management.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the primary software engineering concepts and recent approaches in software development	K1
CLO2	Understand the various software process models, frameworks and DevOps tools	K2
CLO3	Apply the software practices and tools to design software	K3
CLO4	Analyze the diverse software process models, frameworks, business methodology and tools	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Software Process Management–CG23C07

(58 Hrs)

Syllabus

Unit I **12 Hrs**

Software and software Engineering: The Nature of Software - **The Unique Nature of WebApps**-Software Engineering- Software Process - **Software Engineering Practice**-Software Myths. Software Process Model: A Generic Process Model - Process Assessment and Improvement - Perspective Process Models.

Unit II **11 Hrs**

Agile development: Agility - Agile process - Extreme programming (XP) - Other Agile Process Models. Scrum: Introduction - Scrum Framework - Scrum Roles - Product owner - Scrum Master -Development Team - **Scrum Activities and Artifacts Product Backlog** - Sprints - Sprint Planning and execution - Daily Scrum - Done - Sprint review - Sprint Retrospective.

Unit III **12 Hrs**

DevOps: Introduction to DevOps - Getting started with DevOps - Continuous Integration and Continuous Delivery - The CI/CD principles - Using a package manager - Using Jenkins - Using Azure Pipelines - Using GitLab CI - Containerizing Your Application with Docker - **Installing Docker - Registering on Docker Hub - Docker installation** - An overview of Docker's elements - Creating a Dockerfile - Building and running a container on a local machine - **Pushing an image to Docker Hub.**

Unit IV **12 Hrs**

Lean UX and Agile Integrating Lean UX and Agile -Definitions - Staggered Sprints and their Modern Offshots - Dual Track Agile - Exploiting the Rhythms of Scrum to build a lean UX practice-Participation -Beyond the Scrum Team - **Lean UX and Agile in the Enterprise.**

Unit V **11 Hrs**

Design Thinking: Introduction to Design Thinking -Lean thinking - Actionable Strategy- **The Problem with Complexity**- Vision and Strategy - Defining Actionable Strategy - Act to Learn - Leading Teams to Win.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Roger S Pressman	Software Engineering A Practitioner’s Approach (Unit I & II)	MC -Graw Hill Higher Education	2017, 7th Edition,
2	Mikael Krief	Learning DevOps (Unit III)	Packt Publishing Ltd.	2019, 1st Edition,
3	Stephen Haunts	Essential of Scrum (Unit II)	Addison-Wesley Professional	2012, 1st Edition
4	Jeff Gothelf, Josh Seiden	Lean UX (Unit IV)	O’Reilly Media	2020, 2nd Edition
5	Jonny Schneider	Understanding Design Thinking, Leanand Agile (Unit V)	O’Reilly Media	2017, 1st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Ian Sommerville	Software Engineering	Pearson Education	2017, 10th Edition
2	Ralf Kneuper	Software Processes and Life Cycle Models	Springer	2018, 1st Edition

3	James Edge, Agile	An Essential Guide to Agile Project Management, The Kanban Process and Lean Thinking	Create Space Independent Publishing	2018, 1st Edition
4	MiteshSoni	Devops for Web Development	Packet Publishing	2016, 1st Edition

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

- Mrs. D. Suganthi

Course Code	Course Name	Category	L	T	P	Credit
CG23C08	**Java Programming**	**Theory**	**43**	**2**	**-**	**3**

Preamble

This course covers core Java programming concepts, including OOP, exception handling, multithreading, JavaFXand JDBC. It equips learners with the skills required to build robust Java applications, graphical user interfaces and establish database connectivity.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledg e Level
CLO1	Recall core Java concepts to build object-oriented applications.	K1
CLO2	Understand exception handling, multithreading and synchronization for building robust, high-performance applications.	K2
CLO3	Apply JavaFX to design interactive user interfaces.	K3
CLO4	Analyze JDBC for database communication in data-driven applications.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Java Programming-CG23C08 **(43 Hrs)**

Syllabus

Unit I **8 Hrs**

An Overview of Java- Object oriented Programming **-** Using Blocks of Code - Lexical Issues-**Data Types - Variables-** Arrays - Operators -**Control Statements-** Classes - Objects - Constructors - Overloading method.

Unit II **9 Hrs**

Inheritance - Packages -Packages and Member Access - Importing Packages -Interfaces - **Exception Handling - Exception Types - Using Try and Catch** - Nested Try - Throw - Throws -Nyaya Sutra and Logical Reasoning in Exception Handling, Karma Theory andException Propagation.**Multithreaded Programming**- Thread Model- Thread priorities-

Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads -Using Multithreading.

Unit III **8 Hrs**

String Handling - **String Operations** - Character Extraction - **String Comparison - Searching String** - Modifying String -Primitive Type Wrappers - I/O Basics -Byte & Character Streams- Reading Console Input - Writing Console Output - Reading and Writing Files**.**

Unit IV **9 Hrs**

JAVAFX Events and Controls: Event Basics - Handling Key and Mouse Events Controls: Checkbox, ToggleButton- RadioButtons- ListView- ComboBox- ChoiceBox- Text Controls - ScrollPane. Layouts: FlowPane- HBox and VBox- BorderPane- StackPane- GridPane. Menus: Basics - Menu - Menu bars - MenuItem.

Unit V **9 Hrs**

Java Database Connectivity: Database Server - Database Clients - JDBC - Working with Oracle DB - Registering the Driver - Connecting to a Database - Preparing SQL Statements - Using JDBC - ODBC Bridge Driver to Connect to Oracle Database - **Types of ResultSets**.

Text Book

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Herbert Schildt	Java: The Complete Reference	McGraw Hill Education	2021, 12th Edition
2	Carl Dea, Gerrit Grunwald	JavaFX 9 by Example	Apress	2017, 3rd edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	E. Balaguruswamy	Programming with JAVA	McGraw Hill	2023,7th edition
2	Paul Deitel and Harvey Deitel	Java How to Program	Pearson Education	2018, 11th edition

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Name	Category	L	T	P	Credit
CG23CP7	**Java Programming Lab**	**Practical**	**-**	**-**	**45**	**3**

Preamble

The lab course provides hands-on experience in object-oriented programming, multithreading, exception handling, file I/O, database connectivity and JavaFX for building graphical user interfaces. It enables the development of industry-relevant applications and practical problem-solving.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand object-oriented programming concepts such as classes, objects, inheritance and polymorphism.	K2
CLO2	Apply the principles of packages, multithreading, exception handling and file I/O operations to analyze and solve problems.	K3
CLO3	Utilize JavaFX to design and implement graphical user interfaces for real-world applications.	K3
CLO4	Apply Database Connectivity to connect with databases, execute SQL queries and manage data effectively.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	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

Java Programming Lab-CG23CP7 **(45 Hrs)**

List of Programs

- Develop programs using conditional and looping structures
- Create a program demonstrating the definition of classes and objects with constructors for initialization
- Implement a program demonstrating single and multilevel inheritance with overridden methods
- Create a program implementing multiple interfaces and defining abstract methods
- Develop an application using custom packages to structure utility and business logic classes
- Write a program to demonstrate thread creation, synchronization and inter-thread communication

- Implement programs that handle various exception scenarios using try, catch, finally, throw and throws
- Create a program to perform operations like concatenation, comparison, search and substring extraction on strings
- Write a program to demonstrate file handling operations, such as reading from and writing to files using byte and character streams
- Create a simple JavaFX application to handle key and mouse events
- Design a JavaFX GUI with various controls like CheckBox, RadioButton, ComboBox and TextField
- Develop a program to connect to a database using JDBC, execute SQL queries and handle ResultSet for data retrieval and updates

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Name	Category	L	T	P	Credit
CG23CP8	**DBMS Lab**	**Practical**	**-**	**-**	**45**	**3**

Preamble

The lab course provides a way to explore storing and accessing data in databases through query languages and PL/SQL programming language.

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 constraints, DML and DDL commands.	K2
CLO3	Apply functions, joins and view on data.	K3
CLO4	Demonstrate PL/SQL programming on databases.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	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 - CG23CP8 **(45 Hrs)**

List of Programs

- Create table and explore datatypes
- Exercise using constraints (Not null, Unique, Default, Check, Primary key, Foreign key)
- Explore DDL commands (Create, Alter, Truncate, Rename, drop)
- Explore DML commands (Select, update, delete, insert)
- Exercise to implement built-in functions
- Exercise to implement joins
- Exercise to implement view
- PL/ SQL basic programs -Data types
- PL/ SQL basic programs -Control list
- Exercise to implement PL/SQL basic programs -Loops
- Exercise to implement Procedure using PL/SQL

- Exercise to implement Function using PL/SQL
- Exercise to implement Cursors using PL/SQL
- Exercise to implement Triggers using PL/SQL

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

- Mrs. J. Mythili

Course Code	Course Name	Category	L	T	P	Credit
CG23SCE1	**Coursera - DevOps Tools**	**Theory**	**-**	**-**	**-**	2

Course Contents **(45 Hrs)**

- AWS Cloud Technical Essentials (20Hrs)
- DevOps on AWS: Code, Buildand Test (8 Hrs)
- DevOps on AWS: Release and Deploy (7 Hrs)
- DevOps on AWS: Operate and Monitor (10 Hrs)

Course Code	Course Name	Category	L	T	P	Credit
CG23A01	**Cognition and Problem Solving**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course is designed to provide a comprehensive overview of topics related to the information-processing mechanisms of the mind, including consciousness, perception, attention, memory, conceptual knowledgeand emotions.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts and terminologies in cognitive psychology.	K1
CLO2	Understand the proportional relationships from verbal, graphical, symbolic or numerical scenarios.	K2
CLO3	Apply knowledge and understanding of well-established theories in cognitive psychology and demonstrate the use of traditional research designs in cognitive psychology.	K3
CLO4	Analyze cognitive science concepts including perception, attention, learning, memory, reasoning, problem-solving, judgmentand decision-making.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Cognition and Problem Solving - CG23A01 **(58 Hrs)**

Syllabus

Unit I **10 Hrs**

Introduction to Cognitive Psychology: Introduction - What Is Cognitive Psychology- Psychology B.C.- **Structuralism -Functionalism- Behaviourism** - Early Memory Researchers - Gestalt Approach - Emergence of cognitive psychology - Information-Processing: A Computer Metaphor for Cognition: Connectionism, Alternate approaches to cognitive psychology.

Unit II **10 Hrs**

Perceptual Processes: **Basic Issues In Perception - Bottom-Up and Top-Down Processing** - Basic Tasks of Visual Perception - Multisensory Interaction and Integration- Synesthesia - Comparing the Senses - Perception and Action - **Change Blindness.**

Unit III **12 Hrs**

Working Memory: Introduction - Classical Research on Short-Term Memory - **Brown/Peterson & Peterson Technique** - Serial Position Effect - Semantic Similarity of the Items in Short-Term Memory - Atkinson & Shiffrin's Model of Information Processing - Turn to Working Memory - Evidence for Components with Independent Capacities - **Phonological Loop** - Neuroscience Research on the Phonological Loop.

Unit IV **12 Hrs**

Problem Solving and Creativity: Introduction - Understanding the Problem - Methods of Representing the Problem - Symbols - Matrices - Diagrams - Visual Images - Situated and Embodied Cognition Perspectives on Problem Solving - Situated Cognition - Embodied Cognition - **Problem-Solving Strategies - Analogy Approach - Structure of the Analogy Approach** - Means-Ends Heuristic - Research on the Means-Ends Heuristic - Computer Simulation - **Hill-Climbing Heuristic** - Factors That Influence Problem Solving.

Unit V **14 Hrs**

Future Skills - Critical thinking - **Adaptive thinking** - Cognitive Load Management - Design thinking - Virtual Collaboration - **Cultural Sensitivity.**

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Thomas A. Farmer, Margaret W. Matlin	Cognition (Unit I, II, III & IV)	Wiley Publication	2019, 10th Edition
2	Riegler, B.R., Reigler, G.L.	Cognitive Psychology - Applying the Science of Mind (Unit I & II)	Pearson Education	2016, 4th Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Daniel Reisberg	Cognition: Exploring the Science of the Mind	W. W. Norton & Company	2018, 7th Edition
2	E. Bruce Goldstein	Cognitive Psychology: Connecting Mind, Research, and Everyday Experience	Cengage Learning	2018, 5th Edition
3	Benjafield J G	Cognition	Oxford University Press	2010, 3rd Edition

Web Resources

- https://en.wikibooks.org/wiki/Cognition_and_Instruction/Problem_Solving,_Critical_Thinking_and_Argumentation (Unit - V)

Pedagogy

- Lectures, Group discussions, Assignment

Course Designers

- Mrs. J. Mythili

Course Code	Course Name	Category	L	T	P	Credit
CG23A02	Embedded Systems and Communication Technologies	Theory	58	2	-	3

Preamble

This course provides the knowledge and skills to explore embedded systems, their architecture, design challengesand applications. It focuses on microcontroller-based designs, real-time task management and emerging technologies like Embedded AI and IoT.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall fundamental concepts of embedded systems, including architecture, design process and classifications.	K1
CLO2	Understand the features and applications of microcontroller architectures in embedded systems.	K2
CLO3	Analyze real-time task scheduling, device driver programmingand the use of communication protocols in embedded system designs.	K3
CLO4	Apply knowledge of embedded system design to develop and evaluate functional embedded solutions.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Embedded Systems and Communication Technologies - CG23A02 (58 Hrs)

Syllabus

Unit I **11 Hrs**

Introduction to Embedded Systems: Embedded System - Applications and characteristics of Embedded Systems - Overview of Processors and Hardware units in Embedded System - Embedded Software into a System - Introduction to Embedded System Design - Embedded System Architecture - Embedded System Design and challenges - System-on-Chip (SoC) - Network-on-Chip (NoC)

Unit II **12 Hrs**

8051, AVR, ATmega, MSP 430 and ARM Microcontrollers: Microcontrollers - AVR Microcontrollers - ARM processor-based system design - **Sensors, A/D-D/A Converters, Actuators and Interfacing**: Sensors, A/D- D/A converters and Actuators - Network Embedded Systems - Internet Enabled Systems - Network Protocols - Wireless and Mobile System Protocols

Unit III **12 Hrs**

IoT - System Architecture and Design: Internet Connectivity and IoT Computing - Edge Computing Architecture and Application Areas - IoT Communication Module Protocols-Embedded **AI - System Architecture and Design:** Processing of Machine Learning, Deep Learning, Convolution Network and RNN in Embedded AI - Edge AI and Cloud AI - Embedded AI Hardware and Software Development - Embedded AI applications

Unit IV **12 Hrs**

Real-Time Operating Systems and Real-Time Task Scheduling: Types of Real-Time Tasks and their characteristics - Task Scheduling - Features of a Real-Time Operating Systems - Device Drivers, Interrupts and Service Mechanism - Interrupt Latency and Deadline - Direct Memory Access (DMA) - Device Driver Programming

Unit V **11 Hrs**

Communicating with Peripherals: Serial Communication - TTL Serial - SPI - I2C and TWI. Wireless Communication - Bluetooth - Wi-Fi - Case Study of an Embedded System for a Smart Card, Access Control Systems - Smart Cards - RFIDs - Fingerscan - Case Study of Mobile-Phone Software for Key Inputs

Text Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Raj Kamal	Embedded System: SoC, IoT, AI and Real-time Systems	McGraw Hill Education	2023, 4th Edition
2	Elecia White	Making Embedded Systems	O'Reilly	2024, 1st Edition

Reference Books

S.No	Author	Title of the Book	Publishers	Year and Edition
1	B. George, J. Roy, V. Jagadeesh Kumar, S. C. Mukhopadhyay	Advanced Interfacing Techniques for Sensors	Springer,	2017, 1st Edition
2	Alexander G. Dean	Embedded Systems Fundamentals with Arm Cortex M Based Microcontrollers: A Practical Approach	ARM Education Media	2017, 2nd Edition
3	Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.McKinlay	The 8051 Microcontroller and Embedded Systems Using Assembly and C	Pearson Education India	2011, 2nd Edition
4	JNTU - H&K	Embedded Networking	Professional Publications	2014, 1st Edition

Pedagogy

- Lectures, Group Discussions, Demonstrations, Case studies

Course Designer

- Dr. J. Viji Gripsy