PSGR
Krishnammal College for Women

DEPARTMENT OF COMPUTER SCIENCE WITH COGNITIVE SYSTEMS

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

PSGR Krishnammal College for Women

Department of Computer Science with Cognitive Systems
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^	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	-	-	-	-	-	-	-	-
V	III	CG23C09	Software Testing	CC	4	58	2	3	25	75	100	3
V	III	CG23C10	Introduction to Digital Technology	CC	4	58	2	3	25	75	100	3
V	III	CG23C11	Client Relationship Management	CC	4	58	2	3	25	75	100	3
V	III	CG23E01 CS23E02 CG23E03	Data Mining / Big Data Analytics / Computer Graphics	DSE	5	73	2	3	25	75	100	5
V	III	CG23CP9	Digital Technology Lab	CC	4	60	-	3	15*	35*	50	3
V	III	CG23CP10	Client Relationship Management Lab	CC	4	60	-	3	15*	35*	50	3
V	III	CG23SBP2	Software Testing Lab	SEC	3	41	4	-	100	-	50^	2
V	III	CG20AC1 CG23AC2	Multimedia and its Applications / Healthcare Information Systems	ACC	-	-	-	3	25	75	100	5$
V	IV	NM21CS1	Cyber Security 1	AECC	2	30	-	-	100	-	100	Gr
V	IV	CG23INST	Field work / Institutional Training	DSE	-	-	-	-	100	-	100	2
V	VI	CG23COM	Comprehensive Examination	GC	-	-	-	-	100	-	100	Gr
I - IV	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I - V	VI	16BONL1 16BONL2	Online Course Online Course	ACC	-	-	-	-	-	-	-	-
VI	III	CG23C12	Web Application Development	CC	5	73	2	3	25	75	100	4

VI	III	CG23E04 CG23E05 CG23E06	Artificial Intelligence and Machine Learning / Social Network Analytics / Design and Analysis of Algorithms	DSE	5	73	2	3	25	75	100	4
VI	III	CG23CP11	Mobile Application Development Lab	CC	5	75	-	3	15*	35*	50	3
VI	III	CG23CP12	Web Application Development Lab	CC	5	75	-	3	15*	35*	50	3
VI	III	CG23PROJ	Project and Viva Voce	DSE	7	-	-	-	25	75	100	5
VI	III	CG21SBP3	Artificial Intelligence and Machine Learning lab	SEC	3	41	4	-	100	-	50^	2
VI	III	CG20AC3/ CS21AC4	Internet of Things / Cryptography and Network Security	ACC	SS	-	-	3	25	75	100	5[$]
I - V	VI	16BONL1 16BONL2	Online Course Online Course	ACC	-	-	-	-	-	-	-	-
Total											4600	140

**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

$ Credits applicable to candidates who takes up Advanced Level Course examination

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

COURSE 18 - CG23C09

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

COURSE 19 - CG23C10

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	M	S

COURSE 20 - CG23C11

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

COURSE 21 - CG23E01

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

COURSE 22 - CS23E02

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

COURSE 23 - CG23E03

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

COURSE 24 - CG23CP9

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

COURSE 25 - CG23CP10

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

COURSE 26 - CG23SBP2

CLOs	PO1	PO2	PO3	PO4	PO5
CLO1	S	S	S	M	S
CLO2	M	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

COURSE 27 – CG23C12

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	S	S

COURSE 28 – CG23E04

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

COURSE 29 – CG23E05

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

COURSE 30 - CG23E06

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

COURSE 31 - CG23CP11

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

COURSE 32 - CG23CP12

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

COURSE 33 - CG21SBP3

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S
CLO3	S	M	S	S	S
CLO4	S	S	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	: Preparation of rough draft	10 Marks
			Total:	**25 Marks**

End semester examination:

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

Part IV

Introduction to Entrepreneurship / Women Studies / Value education / Environmental Studies / Design Thinking

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

Professional English

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

Cyber Security I & II

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

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium; L- Low

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

Syllabus

Unit I **7 Hrs**

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

Unit II **8 Hrs**

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

Unit III **10 Hrs**

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

Unit IV **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

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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	Knowledge 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

Course Code	Course Title	Category	L	T	P	Credit
CG23C09	Software Testing	Theory	58	2	-	3

Preamble

This course provides an insight on different software testing techniques, automation tools and test management. It emphasizes test automation using selenium components, web driver methods and data driven testing.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the software testing basics, automation and test management	K1
CLO2	Understand the types of software testing, test automation tools and techniques	K2
CLO3	Apply various software testing methods in writing test cases / test scripts	K3
CLO4	Analyze the software and apply manual or automated software testing	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Software Testing -CG23C09 **58 Hrs**

Syllabus

Unit I **12 Hrs**

Introduction to Testing: The Evolving Profession of Software Engineering - The Role of Process in Software Quality - Testing as a Process. Testing Fundamentals: **Introduction** - **Basic Definitions** - Software Testing Principles- Test Goals, Policies, Plans, And Documentation: Testing and Debugging Goals and Policies - Test Planning - Test Plan Components - **Test Plan Attachments- Test Design Specifications** - Test Case Specifications - Test Procedure Specifications - Locating Test Items - The Test Transmittal Report - **Reporting Test Results**.

Unit II **12 Hrs**

White Box Testing - Static Testing - Structural Testing - Black Box Testing - **Positive and Negative Testing** - Boundary Value Analysis - Equivalence Class Partitioning -Integration Testing - Types of Integration Testing - **System Testing** - Functional Testing - **Non-Functional Testing** - Acceptance Testing.

Unit III **12 Hrs**

Software Test Automation: Test automation -**Need and Scope for Automation** - Criteria for Selecting a Testing Tool -**Test Automation Tools** - Introduction to Selenium - Installing

Selenium Components - Using Selenium IDE - Managing User Interface Controls - **Basics of Java**- Creating First Selenium Web Driver Script.

Unit IV **11 Hrs**

Selenium Methods - Common Selenium Web Driver Methods - **Verification Point in Selenium** - **Features of Web Driver** - Locators - Handling Pop-up Dialogs and Multiple Windows - Working with Dynamic UI Objects.

Unit V **11 Hrs**

Selenium Functions: Using JavaScript - **Minimize and Maximize the Browser Window** - Working with Dropdown Lists - **Working with Radio Buttons and Check Boxes** -Xpath and Properties Finder -Data driven testing using Parameterization - Reporting in Selenium - Batch Execution- Automation Frameworks - **Sample test cases for Automation**.

Text Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Ilene Burnstein	Practical Software Testing: A Process-Oriented Approach	Springer	2010, 1st Edn
2	Srinivasan Desikan, Gopalaswamy Ramesh	Software Testing Principles and Practices	Pearson Education	2012, 1st Edn
3	Navneesh Garg	Test Automation Using Selenium WebDriver with Java	AdactIn Group Pvt Ltd	2014, 1st Edn

Reference Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	RenuRajani	Testing Practitioner Handbook	Packt Publishing Limited	2017, 1st Edn
2	NareshChauhan	Software Testing	Oxford University Press	2016, 2nd Edn
3	Adithya Garg, Ashish Mishra	A Practitioner's Guide to Test Automation Using Selenium	Tata McGraw Hill Education	2015, 1st Edn
4	SatyaAvasarala	Selenium Web Driver Practical Guide	Packt Publishing	2014, 1st Edn

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Designer

- Dr. J. Viji Gripsy

Web References

- http://seleniumhq.org/
- http://sourceforge.net/projects/sahi/
- http://testng.org/doc/index.html

Course Code	Course Title	Category	L	T	P	Credit
CG23C10	Introduction to Digital Technology	Theory	58	2	-	3

Preamble

This course provides an insight on robotic process automation, concepts, workflows, and automation tools. It emphasizes automation tool UiPath activities, workflows in bot development.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall robotic process automation basics, tools, UiPath basic constructs in bot development	K1
CLO2	Understand the need of automation, UiPath sequence, activities and applications	K2
CLO3	Apply various robotic process automation workflows for bot development	K3
CLO4	Analyse the need of robotic process automation and automate real world business processes	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	M	S

S-Strong M-Medium

Introduction to Digital Technology - CG23C10
58Hrs
Syllabus

Unit I **12Hrs**

RPA Foundations: **RPA** -History of RPA- **Benefits of RPA**- Downsides of RPA-RPA Compared to BPO, BPM, and BPA - Consumer Willingness for Automation-The Workforce of the Future- RPA vendors - **UiPath** - Automation Anywhere - Blue Prism Tool - **Comparison of RPA Tools.**

Unit II **12 Hrs**

RPA Skills: On-Premises Vs. the Cloud-Web Technology-Programming Languages and Low Code-**OCR (Optical Character Recognition)**-Databases-**APIs (Application Programming Interfaces)-AI (Artificial Intelligence)**-Cognitive Automation-Agile, Scrum, Kanban, and Waterfall-DevOps-Flowcharts. RPA Planning: The Preliminaries - Use a Consulting Firm - RPA Consulting - Case Studies - Automation - ROI for RPA - **RPA Use Cases** - RPA Plan.

Unit III **12 Hrs**

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

Unit IV **11 Hrs**

Email Automation - Move e-mails to another folder-Mark e-mail as read or unread - Save attachments and e-mails. **Word Automation** - Save document as a different file-Read text from a document- **Export a word document as pdf.**

Unit V **11 Hrs**

Excel automation: Write values into cells - Read values from cells- **Save an excel file indifferent formats (Pdfs, CSV)** File Automation: File create, delete, move folders - Create, delete copy and move files, Check if a folder already exists- **Check if a file already exists**.

Text Books

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

Reference Books

S.No	Author	Title of the Book	Publishers	Year and Edition
1	S. Muhkerjee	Essentials of Robotics ProcessAutomation	Khanna Publishing House	2019, 1st Edn
2	NandanMullakara and Arun Kumar Asokan	Robotic Process Automation Projects	Packt Publishing	2020, 1st Edn
3	Dr. Jisu Elsa Jacob andManjunath N	Robotics Simplified	BPB Publications	2022, 1st Edn

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Designer

- Mrs. J. Mythili

Course Code	Course Title	Category	L	T	P	Credit
CG23C11	Client Relationship Management	Theory	58	2	-	3

Preamble

The course provides an insight on IT Service Management (ITSM), ITIL guidelines, ServiceNow to automate business management. It enables to perform basic and advanced administration using ServiceNow workflow automation platform to improve operational efficiencies in enterprise.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall ITSM, ITIL, ServiceNow basics, scripting, UI policies and business rules	K1
CLO2	Understand basic and system administration using ServiceNow	K2
CLO3	Apply ServiceNow APIs for problem, incident, change and service request management	K3
CLO4	Analyze SLAs and business rules to streamline and automate routine work tasks using ServiceNow	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Client Relationship Management- CG23C11 **58Hrs**

Syllabus

Unit I **12 Hrs**

Service Now Intermediate level / Administrator - ServiceNow Introduction - ServiceNow Platform UI **ServiceNow ITSM overview**-Managing Users, Groups and Roles, departments, companies - Impersonate user - Tables, Columns, Attributes, Dictionary Entries, **Schema Map**-**Managing Forms, Layouts and Lists**-Dictionary Overrides.

Unit II **12 Hrs**

System Properties - Incident management - Assignment Rules- Problem Management- Change management - Managing Update Sets- **Overview of other ITSM Modules** - SLA Basics- **UI Policies and Data Policies**. Introduction to Server-Side Scripting: **Server-side scripting**- Server-Side Glide API -Server-Side script Debugging - Server-Side Scripting Best Practices - Business Rules.

Unit III **12Hrs**

Introduction to Client-Side Scripting: Client - **Side APIs** - **Client Scripts** - Client-Side script Debugging - **Client Glide API** -Best Practices - client-side scripting & UI and Data policies - Modularize programming using UI Actions (both Server and Client Side) - Script Include - **Simple Reference Qualifiers** - **Glide AJAX**-UI Pages - Custom Applications Automated Test Framework - Events-Inbound/Out Bound Notifications-Mail Templates.

Unit IV **11 Hrs**

Manage Workflows- Managing Stage Sets -Manage Workflows -**Flow Designer over**view-Service Catalogs, Categories, Items and variables - **Manage Execution Plans and workflows**- Catalogue UI policies - Order Guides - Record Producers- Scheduled Jobs - Configure and run Reports and Dashboards Security Controls-Database Views. **VTB Agent Intelligence overview** - Restrict access to applications and application modules-Automatically create application Access Controls -Manually create, test, and debug Access Controls-**Managing ServiceNow imports and exports**-Managing Import Sets and Transform Map.

Unit V **11 Hrs**

ServiceNow Service portals overview - ServiceNow Service portals core components - ITSM Virtual Agent - Overview -**Performance Analytics Overview-Service now on Mobile** - Service now Integration Overview.

Text Books

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Tim Woodruff	Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation	Packt Publishing Ltd	2018, 2nd Edn
2	Ashish Rudra Srivastava	ServiceNow Cook Book	Packt Publishing Ltd	2017, 1st Edn

Reference Books

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Andrew Kindred	Mastering ServiceNow Scripting	Packt Publishing Ltd	2018, 2nd Edn
2	Tim Woodruff Ashish Rudra Srivastava Martin Wood	ServiceNow: Building Powerful Workflows	Packt Publishing Ltd	2017, 1st Edn

Web references

- https://docs.servicenow.com/

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Designer

- Mrs. D. Suganthi

Course Code	Course Title	Category	L	T	P	Credit
CG23E01	Data Mining	Theory	73	2	-	5

Preamble

This course covers the basic concepts of data mining principles and methods. It provides insight on classification, and clustering techniques and focuses on applications like web mining, text mining and biological data mining.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of data mining	K1
CLO2	Understand the techniques and algorithmsof data mining	K2
CLO3	Apply classification, prediction, clustering algorithms for simple data mining task	K2
CLO4	Analyze the role of data mining algorithms to solve real world problems	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Data Mining - CG23E01 **73Hrs**

Syllabus

Unit I **15Hrs**

Introduction: Data Mining - KDD vs Data mining-DBMS vs Data Mining-Other areas-Data mining techniques-Issues and challenges-Application areas.

Unit II **15 Hrs**

Association Rule: Introduction-Methods in association rule - Apriori algorithm. Clustering: Introduction- Clustering Paradigms-Partition algorithm-K-medoid algorithms-CLARA-CLARANS - Hierarchical clustering - DBSCAN -BRICH-CURE.

Unit III **15Hrs**

Decision Tree: Introduction-Tree construction principles-Best split-splitting indices-splitting criteria- Tree construction algorithms: CART-ID3-C4.5-CHAID.

Unit IV **14 Hrs**

Other Techniques: Introduction - Neural Networks-Learning in NN-Unsupervised Learning-Genetic Algorithm-Support Vector Machine.

Unit V **14 Hrs**

Web Mining: Introduction-Web mining-Content mining- Structure mining-Usage mining-Text mining - unstructured text-Episode rule discovery for texts-Hierarchy of categories-Text clustering. Temporal and Spatial Mining: Introduction - Temporal Association rules - Sequence Mining - Spatial Mining - Spatial Mining Tasks - Spatial Clustering.

Text Book

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Arun K Pujari	Data Mining Techniques	University Press	2013, 3rdEdn

Reference Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	PangNingTan, Michael Steinbach and VipinKumar.	Introduction to Data Mining	Pearson Education	2016, 1stEdn
2	Max Barmer	Principles of Data Mining	Springer	2016, 3rdEdn
3	Herbert Jones	Data Mining	Bravex Publications	2020, 1stEdn

Pedagogy

- Lectures, Demonstration, Case studies

Course Designer

- Mrs. D. Suganthi

Course Code	Course Title	Category	L	T	P	Credit
CS23E02	Big Data Analytics	Theory	73	2	-	5

Preamble

The course provides an introduction to big data analytics, tools and techniques. It introduces Hadoop architecture and map reduce programming model. It also provides knowledge on No SQL databases, querying model and applications in big data.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basics of big data, tools and techniques in big data analytics	K1
CLO2	Understand the programming models, data storage and querying models and data visualization in big data analytics	K2
CLO3	Apply the big data analytics methods and tools for solving real-world problems	K3
CLO4	Analyze the specific business case and apply appropriate data analytic tools and methods	K4

Mapping with Programme Outcomes

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

S-Strong; M-Medium

Big data analytics - CS23E02 **73 Hrs**

Syllabus

Unit I **15Hrs**

Overview of Big Data: Defining Big Data - Big Data Types - Big Data Analytics - Industry Examples of Big Data - Big Data and Data Risk - Big Data Technologies - Benefits of Big Data - Basics of Hadoop: BigData and Hadoop - Hadoop Architecture - Main Components of Hadoop Framework – AnalysingBigData with Hadoop - Benefits of Distributed Applications - Hadoop Distributed File System - Advantages of Hadoop - Ten Big Hadoop Platforms

Unit II **15 Hrs**

Hadoop Distributed File System: Architecture of APACHE Hadoop HDFS - File Systems - HDFS File Blocks - HDFS File Commands.Map Reduce: Introduction to Map Reduce - Working of Map Reduce - Map operations -Map Reduce Program - Map Reduce User Interfaces.

Unit III **15Hrs**

NoSQL Databases: NoSQL Data Management - Types of NoSQL Databases - Query Model for Big Data - Benefits of NoSQL. HBase, CASSENDRA and JAQL: Introduction to HBase - Row-oriented and Column-oriented Data Stores - HDFS Vs HBase - HBase Architecture - HBase Data Model - Understanding HBase Data Model - Introduction to Cassandra - Features - Data Replication - Components - Cassandra Query Language - Data Model - Data models of Cassandra and RDBMS. Introduction to JAQL - JSON - Components of JAQL.

Unit IV **14 Hrs**

HIVE: Introduction to Hive - Data Models – Building Blocks - Data file formats - Hive for Data warehousing - HiveQL - Data Manipulation - Queries - Hive - Built in Functions. PIG: Introduction - Components - PIG Program Execution Modes - Data formats and Models - Pig vs SQL - Pig Vs Map Reduce - Difference between Hive and Pig - Apache Pig history.

Unit V **14 Hrs**

Data Visualization Tools: Tableau - Advantages - Creating Visualization - Text Table - Heat Maps - Maps with calculated Colours - Creating Maps - Dashboard. Applications:WALMART: How Big Data is used to Drive Supermarket Performance - NETFLIX: How Netflix Used Big Data to Give Us the Programmes We Want - FACEBOOK: How Facebook Use Big Data to Understand Customers.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	V.K. Jain	Big Data and Hadoop	Khanna Book Publishing	2017, 1st Edn
2	Chandraish Sinha	Tableau 10 for Beginners	Createspace Independent Pub	2018, 1st Edn
3	Bernard Marr	Big Data inPractice	Wiley Publications	2016, 1st Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	G. SudhaSadasivam and R. Thirumahal	Big Data Analytics	Oxford University Press	2020, 1st Edn
2	ArshdeepBahga and Vijay Madisetti	Big Data Analytics: A Hands-On Approach	VPT	2018, 1st Edn
3	Paul Zikopoulos and Chris Eaton	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Tata McGraw Hill	2011, 1st Edn

Pedagogy

- Lectures, Demonstration, Case studies

Course Designer

- Dr. N. Prabhu

Course Code	Course Title	Category	L	T	P	Credit
CG23E03	Computer Graphics	Theory	73	2	-	5

Preamble

This course covers computer graphics display devices. It covers the drawing, clipping algorithms, 2D and 3D transformations. It focuses on interactive input methods and functions in computer graphics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the graphics techniques used in various applications and display devices	K1
CLO2	Understand the concept of drawing algorithms, rotation & transformation, clippings and transformations	K2
CLO3	Apply Computer graphic algorithms to solve problems	K3
CLO4	Illustrate the steps to perform 2D & 3D graphic representation in applications	K4

Mapping with ProgrammeLearning Outcomes

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

S-Strong M-Medium

Computer Graphics - CG23E03 **73 Hrs**

Syllabus

Unit I **14 Hrs**

Basic Concepts: Uses of computer graphics - Display devices - Color CRT monitors - Direct view storage tube - Flat panel displays - Raster scan systems - Random scan system, Input and Hard copy device.

Unit II **15 Hrs**

Line drawing algorithms: DDA algorithm - Bresenham's line drawing algorithm - Parallel line algorithms - Circle generating algorithms: Properties of circles, Midpoint circle algorithm.

Unit III **15 Hrs**

Two dimensional transformations: Basic transformations - Composite transformation of translation, Rotation, Scaling - General Pivot point rotation - General fixed point scaling - Other transformations: Reflection, Shear. Two dimensional viewing: Clipping Operations -

Point clipping - Line clipping: Cohen Sutherland line clipping - Curve clipping - Text clipping - Exterior clipping.

Unit IV **14 Hrs**

Graphical User Interface and Interactive Input methods: Input of graphical Data: Logical input devices - Locator Devices - Stroke Devices - String Devices - Valuator Devices - Choice Devices - Pick Devices - Input Functions: Input Modes - Request Modes - Locator and Stroke Input Request Modes, String Modes - Valuator Modes - Choice Modes - Pick Modes - Sample Modes - Event Modes.

Unit V **15 Hrs**

Three dimensional concepts: Three dimensional display methods - Three dimensional geometric and Modeling Transformations: Translation, Rotation and Scaling - Three Dimensional Viewing: Viewing Pipeline - Viewing Coordinates - Projections. Visible Surface Detection Methods: Back Face Detection Method - Depth Buffer Method - Octree Method. Surface Rendering Methods: Polygon Rendering Methods.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Donald Hearn M. Pauline & Baker	Computer Graphics - C Version	Pearson Education Publication	2008, 2nd Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Udit Agarwal	Computer Graphics	S K Kataria& Sons	2013, 1st Edn
2	Pradeep K. Bhatia	Computer Graphics	IK International Publishing House	2013, 3rd Edn
3	John F Hugheset.al.,	Computer Graphics: Principles and Practice	Addison Wesley	2013, 3rd Edn

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Title	Category	L	T	P	Credit
CG23CP9	Digital Technology Lab	Practical	-	-	60	3

Preamble

This course provides hands-on training in the UiPath automation tool. It enables the students to automate the real-world business processes using UiPath.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand UiPath basic constructs in bot development	K2
CLO2	Apply UiPath data types, sequence, activities in automation	K3
CLO3	Illustrate UiPath in real world workflow automation	K3
CLO4	Demonstrate the steps to automate real world business processes	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	M	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium.

Digital Technology Lab - CG23CP9 **60 Hrs**

List of Exercises

- Explore Basic and Desktop Recording in UiPath.
- Automate Notepad operations using UiPath.
- Perform Word Automation tasks such as reading text, saving documents and exporting as PDFs.
- Implement Web Scraping using UiPath for data extraction.
- Automate Google Form filling processes.
- Utilize Anchor-Based Selectors and debug selectors effectively in UiPath.
- Automate WhatsApp messaging using UiPath.
- Automate email tasks, including moving emails, marking them as read/unread, and saving attachments.
- Automate file operations such as creating, deleting, moving files and folders, and checking their existence.
- Perform Excel Automation, including reading/writing values and saving files in different formats.
- Automate PDF-related tasks using UiPath.
- Implement and utilize the Parallel Activity in UiPath to execute multiple workflows simultaneously.

- Develop a program to:
  i) Empty the trash folder in Gmail
  ii) Empty the Recycle Bin on a system
- Automate the process of transferring data from Excel to a web application.
- Automate website login processes.
- Understand and utilize UiPath Orchestrator for bot management and deployment.

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designer

- Mrs. J. Mythili

Course Code	Course Title	Category	L	T	P	Credit
CG23CP10	Client Relationship Management Lab	Practical	-	-	60	3

Preamble

This course provides hands-on training on ServiceNow software platform which helps to automate IT business management. It enables the students to understand, build, and deploy applications on the ServiceNow platform for managing various IT services.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand ServiceNow cloud-based software platform and features	K2
CLO2	Apply ServiceNow to manage different IT services thru client and server scripting, policies, tickets and SLAs	K3
CLO3	Illustrate steps to write, test, and debug client scripts, UI policies and business rules	K3
CLO4	Demonstrate the steps to automate basic and advanced administration using ServiceNow	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Client Relationship Management Lab - CG23CP10 60 Hrs

List of Exercises

- Create and manage users, groups, roles in ServiceNow.
- Configure assignment rules to automate task allocation.
- Set up service level agreements (SLAs) to track service commitments.
- Apply business rules to enforce data consistency, automate processes.
- Implement client-side scripting using Client Scripts, UI Policies, Glide APIs.
- Configure mail templates, manage inbound/outbound email notifications.
- Design workflows to automate business processes.
- Utilize Flow Designer to create automated workflows.
- Build a Service Catalog including categories, items, variables.
- Create an Order Guide to streamline complex service requests.
- Develop Record Producers to simplify data entry, automate record creation.
- Configure applications, secure tables using Access Control Lists (ACLs).
- Generate scheduled reports to track, analyze ServiceNow data.
- Use Import Sets, Transform Maps to import users into the Group table.

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Title	Category	L	T	P	Credit
CG23SBP2	Software Testing Lab	Practical	-	4	41	2

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5
CLO1	S	S	S	M	S
CLO2	M	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

S- Strong; M-Medium.

Software Testing Lab – CG23SBP2 **45 Hrs**

List of Programs

- Create a test case to validate different UI controls.
- Prepare test data in a flat file for automation testing.
- Design a manual test case to verify student grades.
- Develop a program to count the number of students who scored more than 60 in any subject or all subjects.
- Implement a program to log in to a specific web page.
- Write a program to retrieve the number of items in a list or combo box.
- Evaluate an HTML file for functionality and structure.
- Perform testing on an MS Excel program using the Data Driven Wizard.
- Test a Java program that performs the addition of two values.
- Construct a test suite that includes at least four test cases.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Title	Category	L	T	P	Credit
NM21CS1	Cyber Security 1	Theory	30	-	-	Grade

Objective

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

Cyber Security - NM21CS1 **30 Hrs**

Syllabus

Unit I **6 Hrs**

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

Unit II **6 Hrs**

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

Unit III **6 Hrs**

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

Unit IV **6 Hrs**

Social Media Security: Introduction to social network – Types of social media – Social media platform – Hashtag – Viral content – Security issues related to social media. – **Cyber Security tools:** N map – Introduction to Nmap – Nmap scan types- Nmap command list.

Digital Transaction: Introduction to digital payments – Components of digital payments – Modes of digital payments – Banking cards – UPI (Unified Payment Interface) – e-Wallets.

Unit V **6 Hrs**

Digital Devices Security: End point device and Mobile phone security – Password policy – Security patch management – Data backup – Device security policy – Cyber security best practices. Installation and configuration of Computer Anti-Virus.

Case studies: Illustrations of Financial frauds – Digital Signature. Prepare a checklist for secure net banking

*e-Content will be provided

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

Reference books:

1. Raef Meeuwisse, Cybersecurity for Beginners, Lulu Publishing Services,2nd Edition,2017
2. Scott Augenbaum, The Secret to Cybersecurity-A Simple Plan to Protect Your Family and Business from Cybercrime, Forefront Books Publisher,2019
3. SunitBelapure and Nina GodBole, Cyber security understanding cybercrimes computer forensics and Legal perspectives, Wiley India Pvt Ltd, 2011
4. Christopher Hadnagy, Social Engineering: The Science of Human Hacking, Wiley Publisher, 2nd Edition,2018
5. Pavan Duggal, Artificial Intelligence, Cybercrimes & Cyberlaw,2018
6. Joe Gray, Practical Social Engineering: A Primer for the Ethical Hacker, 2022
7. Henry A. Oliver, Security in the digital age: social media security threats and vulnerabilities, Create Space Independent publishing platform, 2015.

Evaluation Pattern

Quiz	60 Marks
Case Study	20 Marks
Poster	20 Marks
Total	100 marks

Course Code	Course Title	Category	L	T	P	Credit
CG20AC1	Multimedia and its Applications	Theory	Self-Study			5

Preamble

This course provides basic concepts in multimedia and devices, systems, tools and techniques. It also focuses on animation, distributing multimedia in networks, art, design and digital cinematography.

Multimedia and its Applications -CG20AC1

Syllabus

Unit I

Multimedia Introduction: Definitions - Classifications of Multimedia -History of Multimedia- Multimedia Objects- Multimedia hardware: Digital Audio and Video hardware- Memory & Storage devices- Communication Devices-Software Executable and Library -Applications of multimedia.

Unit II

Multimedia Tools: Presentation tools- Image Capturing- Authoring tools-Card and Page based authoring tools- Perception of Sound- Hearing sensitivity- Frequency range - Sound-Wave length- The speed of sound-Measuring the sound- Musical sounds- Noise signal-Dynamic range- Microphones types -Phantom power- Choosing the right mike- Mixing console- Input devices-Output devices- Audio Publishing.

Unit III

Text and Sound in Multimedia application: Labels & Captions - Informational text-Navigation and user support-Application of text to multimedia project -Hypertext: Indexed retrieval systems-Multimedia Audio: Digital medium - Digital audio technology - Sound cards - Recording - Editing - MP3 - MIDI fundamentals - Working with MIDI - Audio file formats - Adding sound to Multimedia project.

Unit IV

Multimedia Animation: Computer animation fundamentals - Kinematics - Morphing - Animation

Software tools and techniques -Creating animations-Object based animation-Multimedia Video: How video works - Broadcast video standards - Digital video fundamentals -Digital video production and editing techniques - File formats.

Unit V

Multimedia Project: Stages of project - Multimedia skills - Design concept - Authoring - Planning

and Costing - Multimedia Team-Multimedia looking towards Future: Digital Communication and New Media - Interactive Television- Digital Broadcasting - Digital Radio- Multimedia Conferencing - Contemporary issues:Emerging Fields in Multimedia Technology - Industry Expert Talk.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	David Hillman	Multimedia Technology and Applications	Galgotia Publications pvt. Ltd	2015, 1st Edn
2	Tay Vaughan	Multimedia making it work	Tata Mc-GrawHill Publications	2017, 1st Edn

Reference books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Kiran Thakrar, Prabhat .K. Andleigh	Multimedia System Design	Prentice Hall India	2015, 1st Edn
2	Malay k Pakhira	Computer graphics, Multimedia and Animation	Prentice Hall India.	2010, 2nd Edn

Course Designer

- Mrs. J. Mythili

Course Code	Course Title	Category	L	T	P	Credit
CG23AC2	Healthcare Information Systems	Theory	Self-Study			5

Preamble

This course explores health information systems, their architecture, integration and management in healthcare. It emphasizes data security, interoperability and balanced system functionality.

Healthcare Information Systems - CG23AC2

Syllabus

Unit I

Introduction, Data, Information, and Knowledge - Health care Settings - Systems and Subsystems - Information Systems - Health Information Systems - Information Logistics in Health Information Systems - Functions, Processes, and Entity Types in Health care Settings - Application Systems, Services, and Physical Data Processing Systems in Health Information Systems - Electronic Health Records as a Part of Health Information Systems - Architecture and Infrastructure of Health Information Systems - Management of Information Systems.

Unit II

Technological Perspective: Architecture, Integration, and Standards - Introduction - Domain Layer: Data to be Processed and Provided - Personal vs. Non-personal Data - Standardized vs. Non-standardized Data - Entity Types - Domain Layer: Functions to Be Supported - Logical Tool Layer: Types of Application Systems in Health care Facilities - Patient Administration Systems - Medical Documentation and Management Systems (MDMS) - Nursing Management and Documentation Systems (NMDS) - Computerized Provider Order Entry Systems (CPOE) - Picture Archiving and Communication Systems (PACS) - Laboratory Information Systems (LIS) - Operation Management Systems (OMS). Patient Data Management Systems (PDMS) - Enterprise Resource Planning Systems (ERPS) - Data Warehouse Systems (DWS). Document Archiving Systems (DAS) - Application Systems for Patients and Informal Caregivers.

Unit III

Logical Tool Layer: Data Integrity - Logical Tool Layer: Architectural Styles - Number of Databases: Central vs. Distributed - Number of Application Components: Monolithic vs. Modular - Number of Application Software Products and Vendors: All-in-One vs. Best-of-Breed - Logical Tool Layer: Interoperability and Standards - Logical Tool Layer: Types of Integration - Data Integration - Semantic Integration - User Interface Integration - Context Integration - Feature Integration - Process Integration - Logical Tool Layer: Integration Technologies and Tools - Transaction Management - Communication Server - Open Platforms and Vendor-Neutral Archives - Service-Oriented Architectures.

Unit IV

Physical Tool Layer - Physical Data Processing Systems - Physical Interoperability and Integration by Communication Networks - Data Centers - Data Security - A Reference

Model for the Domain Layer of Hospital Functions - The Domain Layer of CityCare - The Logical Tool Layer of CityCare - The Physical Tool Layer of CityCare - Strategic Management of Information Systems - Tactical Management of Information Systems - Operational Management of Information Systems.

Unit V

Balance as a Challenge for the Management of Health Information Systems - Balance of Homogeneity and Heterogeneity - Balance of Computer-Based and Paper-Based Tools - Balance of Data Security and Working Processes - Balance of Functional Leanness and Functional Redundancy - Balance of Documentation Quality and Documentation Efforts - Case Studies: Strategic Information Management Plan of Ploetzberg - Health Information System Key Performance Hospital Indicators (KPIs) of Ploetzberg Hospital - Organization of the Management of the Ploetzberg Hospital Information System.

Text Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Alfred Winter, Reinhold Haux , Elske Ammenwerth , Birgit Brigl , Nils Hellrung , Franziska Jahn	Health Information Systems: Technological and Management Perspectives	Springer	2023, 3rd Edn

Reference Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Karen A. Wager Frances W. Lee John P. Glaser	Health Care Information Systems: A Practical Approach for Health Care Management	Jossey Bass	2022, 5th Edn
2	Fay Cobb Payton and Joseph K H Tan	Adaptive Health Management Information Systems: Concepts, Cases, & Practical Applications	Jones and Bartlett	2019, 4th Edn

Pedagogy

- Lectures, Group Discussions, Demonstrations, Case studies

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Title	Category	L	T	P	Credit
CG23C12	Web Application Development	Theory	73	2	-	4

Preamble

This course provides the basic knowledge of server-side scripting with PHP and database integration with MySQL. It also includes frameworks like Node.js and ReactJS for developing dynamic and interactive web applications.

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 server-side scripting, including syntax, variables, control structures and data passing mechanisms in PHP.	K1
CLO2	Understand file handling concepts, session management, cookies and HTTP communication to manage state and data effectively in web applications.	K2
CLO3	Apply SQL operations and integrate PHP with MySQL to develop functional and data-driven web applications.	K3
CLO4	Analyze the use of Node.js for server-side scripting and ReactJS for front-end development to create interactive and efficient web solutions.	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	S	S

S-Strong; M-Medium

Web Application Development - CG23C12 (73 Hrs)

Syllabus

Unit I **14 Hrs**

Introduction: Server-Side Web Scripting - Syntax and Variables - Control and Functions - Boolean expressions, Branching, Looping. Passing Information between Pages: GET Arguments - POST Arguments - Formatting Form Variables - String: Strings in PHP - Essential String Functions. Arrays and Array Functions: Uses of Arrays - Creating Arrays - Retrieving Values - Iteration.

Unit II **15 Hrs**

Working with the File system: PHP File Permissions - File Reading and Writing Basics - File system Functions. Working with Sessions and Cookies: Sessions in PHP - Session Functions - Cookies - Sending HTTP Headers.

Unit III **15 Hrs**

Structured Query Language (SQL): Relational Database and SQL - SQL Standards - Basic CRUD Operations (SELECT, INSERT, UPDATE, DELETE). PHP and MYSQL: Connecting to MySQL - Making MySQL Queries - Fetching Data Sets - Error Checking - Basic Database Creation with PHP.

Unit IV **15 Hrs**

Node.js: Getting Started with Node.js - Using Events, Listeners and Callbacks in Node.js - Accessing the File System - Implementing HTTP Services in Node.js.

Unit V **14 Hrs**

ReactJS: Introduction to ReactJS - React Components: React Classes - Passing Data using Props - React State: Initial State - Updating State - Event Handling - Simple Routing with React Router.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Jon Duckett	"PHP & MySQL: Server-side Web Development"	John Wiley & Sons Inc	2022, 1st Edn.
2	Brad Dayley, Brendan Dayley, Caleb Dayley	Node.js, MongoDB and Angular Web Development	Addison-Wesley	2018, 2nd Edn.
3	Vasan Subramanian	Pro MERN Stack: Full Stack Web App Development with Mongo, Express, Reactand Node	Apress	2019, 2nd Edn.

Reference Books

S. No	Author	Title of the book	Publisher	Year and Edition
1	David T. Nguyen	Full Stack Web Development with PHP, MySQL, Node.js, and React	Apress	2021, 1st Edn.
2	Luke Welling and Laura Thomson	PHP and MySQL Web Development	Pearson Education	2020, 6th Edn.

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

Course Contents and Presentation Schedule

CG23C12 - Web Application Development					
Module No.	**Topic**	**CLO level**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
Unit – I					
1	Introduction to Server-Side Web Scripting	CLO1, CLO2	1	PPT	Participatory Learning
2	Syntax and Variables	CLO1, CLO2	1	Lecture	Experiential Learning
3	Control and Functions	CLO1, CLO2	1	Lecture / Seminar	Experiential Learning
4	Boolean expressions	CLO1, CLO2	1	Demonstration	Participatory Learning
5	Branching	CLO1, CLO2	1	Lecture / Seminar	Problem-based Learning
6	Looping	CLO1, CLO2	1	PPT	Experiential Learning
7	Passing Information between Pages - GET Arguments	CLO2	1	Demonstration	Experiential Learning
8	Passing Information between Pages - POST Arguments	CLO2	1	Demonstration	Problem-based Learning
9	Formatting Form Variables	CLO2, CLO3	1	Lecture / Seminar	Experiential Learning
10	String: Strings in PHP	CLO3	1	Lecture / Seminar	Problem-based Learning
11	Essential String Functions	CLO3	1	PPT	Experiential Learning
12	Arrays and Array Functions	CLO2, CLO3	1	PPT	Participatory Learning

13	Uses of Arrays - Creating Arrays	CLO2, CLO3	1	Demonstration	Problem-based Learning
14	Retrieving Values - Iteration	CLO3	1	Lecture / Seminar	Experiential Learning
Unit – II					
15	Working with the File System	CLO2, CLO3	1	Lecture / Seminar	Participatory Learning
16	PHP File Permissions	CLO2, CLO3	1	Lecture / Seminar	Participatory Learning
17	File Reading and Writing Basics	CLO2, CLO3	2	PPT	Problem-based Learning
18	File System Functions	CLO2, CLO3	2	Lecture / Seminar	Experiential Learning
19	Introduction to Sessions & Cookies	CLO3, CLO4	2	PPT	Participatory Learning
20	Sessions in PHP	CLO3, CLO4	2	Demonstration	Participatory Learning
21	Session Functions	CLO3, CLO4	2	Lecture / Seminar	Experiential Learning
22	Cookies	CLO3, CLO4	2	Lecture / Seminar	Participatory Learning
23	Sending HTTP Headers	CLO3, CLO4	1	Demonstration	Experiential Learning
Unit – III					
24	Structured Query Language (SQL) Basics	CLO2, CLO3	1	Lecture	Participatory Learning
25	Relational Database and SQL	CLO2, CLO3	2	Lecture / Seminar	Participatory Learning
26	SQL Standards	CLO3	1	PPT	Participatory Learning

27	SQL CRUD Operations (SELECT)	CLO2, CLO3	1	Demonstration	Problem-based Learning
28	SQL CRUD Operations (INSERT)	CLO2, CLO3	1	Demonstration	Problem-based Learning
29	SQL CRUD Operations (UPDATE)	CLO2, CLO3	1	Demonstration	Problem-based Learning
30	SQL CRUD Operations (DELETE)	CLO2, CLO3	1	Demonstration	Problem-based Learning
31	PHP and MYSQL	CLO3, CLO4	1	Lecture / Seminar	Participatory Learning
32	Connecting to MySQL	CLO3, CLO4	1	Demonstration	Experiential Learning
33	Making MySQL Queries	CLO2, CLO3	1	Demonstration	Problem-based Learning
34	Fetching Data Sets	CLO3, CLO4	1	Lecture / Seminar	Experiential Learning
35	Error Checking	CLO3, CLO4	1	Lecture	Problem-based Learning
36	Basic Database Creation with PHP	CLO3, CLO4	2	Demonstration	Experiential Learning
Unit – IV					
37	Getting Started with Node.js	CLO1, CLO2	2	PPT	Participatory Learning
38	Using Events in Node.js	CLO2, CLO3	3	Demonstration	Experiential Learning
39	Listeners in Node.js	CLO2, CLO3	2	Lecture	Participatory Learning
40	Callbacks in Node.js	CLO2, CLO3	2	Lecture	Participatory Learning
41	Accessing the File System in Node.js	CLO3, CLO4	3	Demonstration	Experiential Learning

42	Implementing HTTP Services in Node.js	CLO3, CLO4	3	Demonstration	Problem-solving
Unit V					
43	Introduction to ReactJS	CLO1, CLO2	2	Lecture	Participatory Learning
44	React Components: React Classes	CLO2, CLO3	2	Demonstration	Participatory Learning
45	Passing Data using Props	CLO2, CLO3	2	Demonstration	Experiential Learning
46	React State: Initial State	CLO3, CLO4	2	Lecture	Experiential Learning
47	React State: Updating State	CLO3, CLO4	2	Demonstration	Problem-based Learning
48	Event Handling	CLO3, CLO4	2	Demonstration	Experiential Learning
49	Simple Routing with React Router	CLO4	2	Demonstration	Problem-based Learning

Course Designer

- Dr. J. Viji Gripsy

Name of the course	Web Application Development
Participatory Learning	40 %
Experiential Learning	40 %
Problem-based Learning	20 %

Course Code	Course Title	Category	L	T	P	Credit
CG23E04	Artificial Intelligence and Machine Learning	Theory	73	2	-	4

Preamble

This course introduces basic artificial intelligence techniques, concepts of deep learning, natural language processing and insights in machine learning algorithms regression and classification.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of artificial intelligence and machine learning techniques.	K1
CLO2	Understand the various artificial intelligence techniques like heuristics, searching, regression, classification, deep learning and natural language processing.	K2
CLO3	Apply artificial intelligence techniques to solve problems.	K3
CLO4	Analyze real world problems to solve using artificial intelligence and machine learning algorithms.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Artificial Intelligence and Machine Learning - CG23E04

(73 Hrs)

Syllabus

Unit I **14 Hrs**

Introduction to Artificial Intelligence - The Foundations of Artificial Intelligence - Agents and Environments -The Structure of Agents Intelligent Agents: Agent programs - Simple reflex agents - Model-based reflex agents - Goal-based agents- Utility-based agents - Learning agents- How the components of agent programs work.

Unit II **15 Hrs**

Solving Problems by Searching: Problem-Solving Agents: Search problems and solutions - Formulating problems - Example Problems - Search Algorithms - Uninformed Search Strategies: Breadth-first search - Dijkstra's algorithm or uniform-cost search - Depth-first search and the problem of memory - Depth-limited and iterative deepening search - Bidirectional search - Comparing uninformed search algorithms - Informed (Heuristic) Search Strategies:Greedy best-first search - A* search - Search contours - Satisficing search: Inadmissible heuristics and weighted A* - Memory-bounded search - Bidirectional heuristic search.

Unit III **14 Hrs**

Regression - Introduction - Linear Regression with One Variable - Features and Labels - Feature Scaling - Cross-Validation with Training and Test-DataFitting a Model on Data with scikit-learn - Linear Regression Using NumPy Arrays - Fitting a Model Using NumPyPolyfit-Predicting values with Linear Regression.

Unit IV **15 Hrs**

Classification - Introduction - The Fundamentals of Classification -Data preprocessing- The k-nearest neighbor Classifier - Introducing the k-Nearest Neighbor Algorithm - Distance Functions - Parameterization of the k-nearest neighbor Classifier in scikit-learn - Classification with Support Vector Machines - Understanding Support Vector Machines - Support Vector Machines in scikit-learn - Parameters of the scikit-learn SVM - Evaluating the Performance of Classifiers - Confusion Matrix.

Unit V **15 Hrs**

Introduction to Neural Networks - Biases - Use Cases for Artificial Neural Networks - Activation Functions - Forward and backward propagation - Introduction to Deep Learning - Introduction to Convolutional Neural Network - Natural Language Processing - Introduction - Terminologies in NLP - Applications of NLP.

Text Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach	Pearson	2024, 4th Edn.
2	Zsolt Nagy	Artificial Intelligence and Machine Learning Fundamentals	Packt	2018, 1st Edn.
3	Rajesh Arumugam and Rajalingappaa Shanmugamani	Hands on Natural Language Processing with Python	Packt	2018, 1st Edn.

Reference Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	Peter Norvig and Stuart J. Russell	Artificial Intelligence: A Modern Approach	Pearson Education	2020, 1st Edn.
2	Prateek Joshi	Artificial Intelligence with Python	Packt	2018, 1st Edn.

Pedagogy

- Lectures, Group Discussions, Demonstrations, Case studies

Course Contents and Presentation Schedule

CG23E04 - Artificial Intelligence and Machine Learning					
Module No.	**Topic**	**CLO level**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
Unit – I					
1	Introduction to Artificial Intelligence	CLO1	1	Lecture – Chalk and Talk	Participatory Learning
2	The Foundations of Artificial Intelligence	CLO1	1	PPT	Participatory Learning
3	Agents and Environments	CLO2	2	PPT	Experiential Learning
4	The Structure of Agents	CLO2	2	Lecture / Seminar	Participatory Learning
5	Intelligent Agents: Agent Programs	CLO2, CLO3	2	Demonstration	Experiential Learning
6	Simple reflex agents and Model-based reflex agents	CLO2, CLO3	2	Lecture / Seminar	Experiential Learning
7	Goal-based and Utility-based Agents	CLO2, CLO3	2	Lecture / Seminar	Experiential Learning
8	Learning Agents and Component Analysis	CLO2, CLO4	2	PPT	Participatory Learning
Unit – II					
9	Problem-Solving Agents	CLO1, CLO2	1	Lecture / Seminar	Participatory Learning

10	Search Problems and Solutions	CLO1, CLO2	1	Demonstration	Experiential Learning
11	Formulating Problems and Example problems	CLO2	1	Demonstration	Problem-based Learning
12	Search Algorithms - Uninformed Search Strategies	CLO2	1	PPT	Participatory Learning
13	Breadth-First Search (BFS)	CLO2, CLO3	1	Demonstration	Participatory Learning
14	Dijkstra's Algorithm (Uniform-Cost Search)	CLO2, CLO3	1	Demonstration	Experiential Learning
15	Depth-First Search (DFS) and Memory Issues	CLO3	1	Demonstration	Experiential Learning
16	Depth-Limited and Iterative Deepening Search	CLO2, CLO3	1	Demonstration	Experiential Learning
17	Bidirectional Search	CLO3	1	Lecture / Seminar	Participatory Learning
18	Comparing Uninformed Search Algorithms	CLO3, CLO4	1	PPT	Participatory Learning
19	Greedy Best-First Search	CLO2, CLO3	1	Demonstration	Participatory Learning
20	A* Search and Search Contours	CLO3	1	Demonstration	Experiential Learning
21	Satisficing Search	CLO3	1	Lecture / Seminar	Participatory Learning
22	Inadmissible Heuristics and Weighted A*	CLO3, CLO4	1	Demonstration	Experiential Learning
23	Memory-Bounded and Bidirectional Heuristic Search	CLO4	1	Lecture / Seminar	Problem-based Learning

Unit – III					
24	Regression: Introduction	CLO1, CLO2	1	Lecture / Seminar	Participatory Learning
25	Linear Regression with One Variable	CLO2, CLO3	1	Demonstration	Experiential Learning
26	Features and Labels	CLO2, CLO3	1	Lecture / Seminar	Experiential Learning
27	Feature Scaling	CLO3, CLO4	1	Demonstration	Experiential Learning
28	Cross-Validation with Training and Test Data	CLO3	2	Demonstration	Experiential Learning
29	Fitting a Model on Data with scikit-learn	CLO3	2	Demonstration	Experiential Learning
30	Linear Regression Using NumPy Arrays	CLO3	2	Demonstration	Experiential Learning
31	Fitting a Model Using NumPy Polyfit	CLO3, CLO4	2	Lecture / Seminar	Problem-based Learning
32	Predicting Values with Linear Regression	CLO4	2	Demonstration	Experiential Learning
Unit – IV					
33	Introduction to Classification	CLO1, CLO2	1	Lecture / Seminar	Participatory Learning
34	Fundamentals of Classification	CLO2	1	PPT	Participatory Learning
35	Data Preprocessing	CLO2, CLO3	2	Demonstration	Experiential Learning

36	k-Nearest Neighbor (k-NN) Classifier	CLO2, CLO3	1	Lecture / Seminar	Participatory Learning
37	k-NN Algorithm and Distance Functions	CLO3	2	Demonstration	Experiential Learning
38	Parameterization of k-NN in scikit-learn	CLO3	2	Demonstration	Experiential Learning
39	Introduction to Support Vector Machines	CLO2	1	Lecture + Case Studies	Participatory Learning
40	SVM in scikit-learn	CLO3	2	Demonstration	Experiential Learning
41	Parameters of SVM in scikit-learn	CLO3	1	Lecture / Seminar	Participatory Learning
42	Evaluating Classifiers: Confusion Matrix	CLO3, CLO4	2	Demonstration	Problem-based Learning
Unit – V					
43	Introduction to Neural Networks	CLO1, CLO2	1	PPT	Participatory Learning
44	Biases and Use Cases	CLO2	2	Lecture / Seminar	Participatory Learning
45	Activation Functions	CLO2, CLO3	2	Demonstration	Experiential Learning
46	Forward Propagation	CLO3	1	Demonstration	Experiential Learning
47	Backward Propagation	CLO3	1	Demonstration	Experiential Learning
48	Introduction to Deep Learning	CLO2	1	Lecture / Seminar	Participatory Learning

49	Introduction to Convolutional Neural Network	CLO3	2	PPT	Experiential Learning
50	Natural Language Processing - Introduction	CLO1, CLO2	1	Lecture / Seminar	Participatory Learning
51	Terminologies in NLP	CLO2	2	PPT	Participatory Learning
52	NLP Applications	CLO4	2	Lecture / Seminar	Participatory Learning

Course Designer

- Mrs. J. Mythili

Name of the course	Artificial Intelligence and Machine Learning
Participatory Learning	40 %
Experiential Learning	40 %
Problem-based Learning	20 %

Course Code	Course Title	Category	L	T	P	Credit
CG23E05	Social Network Analytics	Theory	73	2	-	4

Preamble

This course explores the structure, patterns, and dynamics of relationships within networks, uncovering valuable insights from interconnected data. It integrates graph theory, data mining, and statistical techniques to analyze user interactions, communities, and influence.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental concepts, applications, and types of Social Network Analysis	K1
CLO2	Understand community detection algorithms, network structures, and their applications	K2
CLO3	Apply techniques for temporal and dynamic network analysis including diffusion and epidemic models	K2
CLO4	Analyze advanced computational and statistical methods such as link prediction, embeddings, and probabilistic models	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Social Network Analytics - CG23E05 (73 Hrs)

Syllabus

Unit I 15 Hrs

Network and Society: Introduction to Social Network Analysis-Applications of Social Network Analysis-Preliminaries-Network Types-Link-Centric View-Three levels of Social Network Analysis-Graph Visualization tools-Web Based tools-Standalone tools-Network basics-Node Centrality.

Unit II 15 Hrs

Community Detection and Network Structure: Community Detection Algorithms: Modularity, Louvain, Girvan–Newman, Label Propagation-Overlapping and Hierarchical Communities-Structural Equivalence and Blockmodeling-Core-Periphery Structures and Network Motifs-Applications: Online Communities, Social Groups, and Organizational Networks

Unit III **15 Hrs**

Dynamic and Temporal Network Analysis: Evolution of Networks: Growth Models (Preferential Attachment, Small-World Models)-Temporal Networks: Time-Stamped Edges, Sliding Window Models-Diffusion Processes: Information Spread, Rumor Dynamics, Viral Marketing-Epidemic Models in Networks (SIR, SIS, SEIR)-Network Robustness, Resilience, and Cascading Failures

Unit IV **14 Hrs**

Advanced Computational and Statistical Methods: Probabilistic Graphical Models for Networks (ER, SBM, Exponential Random Graph Models)- Link Prediction Techniques: Similarity-Based, Probabilistic, and Deep Learning Approaches-Graph Embeddings: Node2Vec, DeepWalk, GraphSAGE, GCNs-Multiplex and Multilayer Networks-Network Sampling and Big Data Challenges

Unit V **14 Hrs**

Applications, Tools, and Emerging Trends: Social Media Analytics: Twitter, Facebook, LinkedIn Data Mining-Sentiment and Opinion Dynamics in Networks-Influence Maximization and Recommender Systems-Ethical Considerations: Privacy, Bias, Fairness in Network Analysis-Tools and Frameworks: Gephi, Pajek, NetworkX, SNAP, Neo4j-Emerging Directions: Knowledge Graphs, Hypergraphs, Temporal GNNs, Explainable AI in SNA

Text Book

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Tanmoy Chakraborty	Social Network Analysis	Wiley India Pvt. Ltd	2021, 1st Edn.
2	John McLevey,John Scott & Peter J.Carrington	The SAGE Handbook of Social Network Analysis	The SAGE Publications	2024, 2nd Edn.

Reference Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	David Knoke & Song yang	Social Network Analysis	Sage Publications	2019, 1st Edn.
2	Niyati Aggrawal &Adarsh Anand	Social Networks: Modelling and Analysis	CRC Press	2022, 1st Edn.
3	Charu C. Aggarwal	Social Network Data Analytics	Springer New York Dordrecht Heidelberg London	2021, 3rd Edn.

Pedagogy

- Lectures, Demonstration, Case studies

Course Contents and Presentation Schedule

CG23E05 – Social Network Analytics					
Module No.	**Topic**	**CLO level**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
Unit – I					
1	Introduction to SNA	CLO1, CLO2	1	Lecture, video	Participatory Learning
2	Applications of SNA	CLO1, CLO2, CLO3	2	Chalk and talk	Participatory Learning
3	Preliminaries of Network Types	CLO1, CLO2, CLO3	2	Video, PPT	Participatory Learning
4	Network Types	CLO2, CLO3	2	Lecture, PPT	Experiential Learning
5	Link-Centric View	CLO2, CLO3	1	Lecture, PPT	Participatory Learning
6	Levels of SNA	CLO2, CLO3, CLO4	3	Video, PPT	Experiential Learning
7	Graph Visualization Tools (Gephi, Pajek, etc.)	CLO2, CLO3	2	Video, PPT	Experiential Learning
8	Node Centrality Measures	CLO2, CLO3,	2	OER	Experiential Learning
Unit – II					
9	Modularity, Louvain	CLO1, CLO2, CLO3	1	Chalk and talk/ Picture	Participatory Learning
10	Girvan–Newman	CLO1, CLO2, CLO3	2	Video	Participatory Learning
11	Label Propagation	CLO2, CLO3	2	Lecture / Seminar	Experiential Learning
12	Overlapping Communities	CLO2, CLO3	1	Lecture, PPT	Problem-based Learning
13	Hierarchical Communities	CLO2, CLO3	2	Lecture, PPT	Participatory Learning
14	Blockmodeling	CLO2, CLO3	1	Video, Lecture	Experiential Learning
15	Core–Periphery	CLO2, CLO3	1	Lecture	Problem-based Learning

16	Network Motifs	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
17	Applications in Online	CLO2, CLO3	2	Video, Lecture	Experiential Learning
18	Organizational Networks	CLO2, CLO3, CLO4	2	Video, Lecture	Problem-based Learning
Unit – III					
19	Growth Models	CLO1, CLO2	1	Chalk and talk	Participatory Learning
20	Preferential Attachment	CLO2, CLO3	2	Chalk and talk	Problem-based Learning
21	Small-World	CLO2, CLO3, CLO4	1	Video	Experiential Learning
22	Temporal Networks	CLO2, CLO3, CLO4	1	Chalk and talk	Problem-based Learning
23	Sliding Windows	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
24	Diffusion Processes	CLO2, CLO3, CLO4	2	Video, Lecture	Experiential Learning
25	Info Spread, Viral Marketing	CLO1, CLO2	2	PPT	Problem-based Learning
26	Epidemic Models (SIR, SIS, SEIR)	CLO2, CLO3	2	Chalk and Talk	Problem-based Learning
27	Network Robustness	CLO2, CLO3	1	Video	Experiential Learning
28	Resilience	CLO2, CLO3, CLO4	2	Video, Lecture	Experiential Learning
Unit – IV					
29	ER, SBM, Exponential Random Graph Models	CLO1, CLO2	2	PPT	Problem-based Learning
30	Link Prediction (Similarity, Probabilistic, DL)	CLO2, CLO3	2	Lecture PPT	Problem-based Learning
31	Graph Embeddings (Node2Vec, DeepWalk, GCNs)	CLO2, CLO3	2	Video	Experiential Learning
32	Multiplex	CLO2, CLO3	2	Video	Experiential Learning

33	Multilayer Networks	CLO2, CLO3	2	Chalk and Talk	Problem-based Learning
34	Network Sampling	CLO2, CLO3	2	Video	Experiential Learning
35	Big Data Challenges	CLO1, CLO2	2	Lecture PPT	Participatory Learning
Unit –V					
36	Social Media Analytics examples	CLO1, CLO2	1	Video, Chalk and talk	Experiential Learning
37	Twitter	CLO2, CLO3	1	Video, Chalk and talk	Experiential Learning
38	Face Book	CLO2, CLO3	1	Lecture PPT	Participatory Learning
39	LinkedIn	CLO3, CLO4	1	Demonstration	Problem-based Learning
40	Sentiment	CLO3, CLO4	1	Video, Demonstration	Problem-based Learning
41	Opinion Dynamics	CLO2, CLO3	1	Demonstration	Experiential Learning
42	Influence Maximization	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
43	Recommender Systems	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
44	Ethical Issues	CLO2, CLO3	1	PPT	Experiential Learning
45	Privacy, Bias, Fairness	CLO2, CLO3	1	Video, PPT	Participatory Learning
46	Tools (Gephi, NetworkX)	CLO4	1	PPT	Problem-based Learning
47	Tools(SNAP, Neo4j)	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
48	Emerging Trends	CLO2, CLO3	1	Video	Experiential Learning
49	Knowledge Graphs, GNNs, XAI	CLO2, CLO3	1	Chalk and talk	Problem-based Learning

Course Designer

- Dr. J. Rajeshwari

Title of the course	Social Network Analytics
Participatory Learning	40 %
Experiential Learning	40 %
Problem-based Learning	20 %

Course Code	Course Title	Category	L	T	P	Credit
CG23E06	Design and Analysis of Algorithms	Theory	73	2	-	4

Preamble

This course introduces the fundamental principles and techniques for crafting efficient, correct, and scalable computational solutions. The course develops a rigorous toolkit like problem modeling, asymptotic analysis, proof of correctness, and complexity classification.

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 algorithm design, efficiency analysis, asymptotic notations, and elementary sorting techniques.	K1
CLO2	Understand divide-and-conquer strategies, advanced sorting algorithms, and their complexity analysis.	K2
CLO3	Apply dynamic programming and greedy strategies to solve optimization and decision-making problems.	K2
CLO4	Analyze graph algorithms, including minimum spanning tree, shortest path, and graph traversal methods, for computational efficiency.	K4

Mapping with Programme Learning Outcomes

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

S-Strong M-Medium

Design and Analysis of Algorithms - CG23E06 (73 Hrs)

Syllabus

Unit I 15 Hrs

Designing of an Algorithm – The Efficiency of Algorithm – Average and Worst Case Analysis – Elementary Operations – Asymptotic Notations – Analyzing Control Statements – Amortized Analysis – Sorting Algorithm – Bubble Sort – Selection Sort – Insertion Sort – Shell Sort.

Unit II 15 Hrs

Divide and Conquer and Advanced Sorting–Efficiency Analysis of Divide and Conquer – Problem Solving using Divide and Conquer – Binary Search – Max-Min Problem – Merge Sort – Quick Sort – Heap Sort – Matrix Multiplication –Sorting in Linear Time – Bucket Sort – Radix Sort – Counting Sort.

Unit III **15 Hrs**

Dynamic programming and Greedy Method –Introduction to Dynamic Programming – Comparison of Dynamic Programming with Other Strategies – Making Change Problem – Assembly Line Scheduling – Knapsack Problem – Shortest Path and Matrix Multiplication – The Floyd – WarshallAlgorithm –Introduction to Greedy Algorithm – Characteristics of Greedy Algorithm – Problem Solving using Greedy Algorithm.

Unit IV **14 Hrs**

Graph Algorithms –Graph Basics and Representations –Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithm –Shortest Path Algorithms –Dijkstra'sAlgorithm – Floyd–Warshall Algorithm– Job Scheduling Problem – Huffman Code – Traversing Graph – Breadth First Search – Depth First Search – Topological Sort – DFS based algorithm – Source Removal Algorithm.

Unit V **14 Hrs**

Backtracking and Branch & Bound –Terminologies used in Backtracking – Algorithms for Backtracking –Applications of Backtracking – The Eight Queens Problem –How to solve n-Queen's Problem – Knapsack Problem –Traveling Salesman Problem – Row Minimization – Column Minimization – Dynamic Reduction – Minimax Principle.

Text Book

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Anuradha A. Puntambekar	Analysis and Design of Algorithms	Technical Publications	2020, 1st Edn.

Reference Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	Introduction to Algorithms	The MIT Press	2022, 4th Edn.
2	Cormen	Introduction to Algorithms	Prentice Hall India	2025, 2nd Edn.
3	S. Sridhar	Design and Analysis of Algorithms	Oxford University Press (India)	2023, 2nd Edn.

Pedagogy

- Lectures, Demonstration, Case studies

Course Contents and Presentation Schedule

CG23E06 - Design and Analysis of Algorithms					
Module No.	**Topic**	**CLO level**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
Unit – I					
1	Introduction	CLO1, CLO2	1	Lecture, video	Participatory Learning
2	Algorithm Design & Efficiency	CLO1, CLO2, CLO3	2	Chalk and talk	Participatory Learning
3	Average/Worst Case Analysis	CLO1, CLO2, CLO3	2	Video, PPT	Participatory Learning
4	Asymptotic Notations	CLO2, CLO3	2	Lecture, PPT	Experiential Learning
5	Control Statements	CLO2, CLO3	1	Lecture, PPT	Participatory Learning
6	Amortized Analysis, Elementary Sorting	CLO2, CLO3, CLO4	3	Video, PPT	Experiential Learning
7	Bubble & Selection sort	CLO2, CLO3	2	Video, PPT	Experiential Learning
8	Insertion & Shell Sort	CLO2, CLO3,	2	OER	Experiential Learning
Unit – II					
9	Divide and Conquer	CLO1, CLO2, CLO3	1	Chalk and talk/ Picture	Participatory Learning

10	Strategy & Analysis	CLO1, CLO2, CLO3	2	Video	Participatory Learning
11	Binary Search	CLO2 , CLO3	2	Lecture / Seminar	Experiential Learning
12	Max–Min Problem	CLO2 , CLO3	1	Lecture, PPT	Problem-based Learning
13	Advanced Sorting	CLO2 , CLO3	1	Lecture, PPT	Participatory Learning
14	Merge sort	CLO2 , CLO3	1	Video, Lecture	Experiential Learning
15	Quick sort	CLO2 , CLO3	1	Lecture	Problem-based Learning
16	Heap Sort	CLO2 , CLO3 , CLO4	1	Video, PPT	Experiential Learning
17	Matrix Multiplication (Strassen's Algorithm)	CLO2 , CLO3	2	Video, Lecture	Experiential Learning
18	Sorting in Linear Time	CLO2 , CLO3 , CLO4	1	Video, Lecture	Problem-based Learning
19	Bucket, & Radix	CLO2 , CLO3	1	Lecture	Problem-based Learning
20	Counting Sort	CLO2 , CLO3	1	Lecture	Problem-based Learning
Unit – III					
21	Introduction to Dynamic Programming	CLO1 , CLO2	1	Chalk and talk	Participatory Learning
22	DP Applications	CLO2 , CLO3	2	Chalk and talk	Problem-based Learning
23	Making Change	CLO2 , CLO3 , CLO4	1	Video	Experiential Learning

24	Assembly Line Scheduling	CLO2, CLO3, CLO4	1	Chalk and talk	Problem-based Learning
25	Knapsack Problem (DP)	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
26	Floyd–Warshall Algorithm (DP for shortest path)	CLO2, CLO3, CLO4	2	Video, Lecture	Experiential Learning
27	Greedy Method: Introduction	CLO1, CLO2	2	PPT	Problem-based Learning
28	Characteristics	CLO2, CLO3	2	Chalk and Talk	Problem-based Learning
29	Greedy Applications: Knapsack	CLO2, CLO3	1	Video	Experiential Learning
30	Shortest Path	CLO2, CLO3, CLO4	2	Video, Lecture	Experiential Learning
Unit – IV					
31	Graph Basics, Representations	CLO1, CLO2	2	PPT	Problem-based Learning
32	Minimum Spanning Tree: Prim's Algorithm	CLO2, CLO3	2	Lecture PPT	Problem-based Learning
33	Kruskal's Algorithms	CLO2, CLO3	1	Video	Experiential Learning
34	Shortest Path: Dijkstra's Algorithm	CLO2, CLO3	2	Video	Experiential Learning
35	Floyd–Warshall Algorithm	CLO2, CLO3	2	Chalk and Talk	Problem-based Learning
36	Job Scheduling, Huffman Coding	CLO2, CLO3	2	Video	Experiential Learning

37	Graph Traversals: BFS, DFS, Topological Sort	CLO1, CLO2	3	Lecture PPT	Participatory Learning
Unit –V					
38	Backtracking Concepts	CLO1, CLO2	1	Video, Chalk and talk	Experiential Learning
39	Terminologies	CLO2, CLO3	1	Video, Chalk and talk	Experiential Learning
40	N-Queens Problem	CLO2, CLO3	2	Lecture PPT	Participatory Learning
41	Backtracking Applications:	CLO3, CLO4	1	Demonstration	Problem-based Learning
42	Knapsack , TSP	CLO3, CLO4	2	Video, Demonstration	Problem-based Learning
43	Branch & Bound, Introduction.	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
44	Concepts	CLO2, CLO3, CLO4	1	Video, PPT	Experiential Learning
45	Row/Column Minimization	CLO2, CLO3	1	PPT	Experiential Learning
46	Branch & Bound Applications	CLO2, CLO3, CLO4	2	Video, PPT	Participatory Learning
47	Knapsack, TSP	CLO4	2	PPT	Problem-based Learning

Course Designer

- Dr. J. Viji Gripsy

Title of the course	Design and Analysis of Algorithms
Participatory Learning	40 %
Experiential Learning	40 %
Problem-based Learning	20 %

Course Code	Course Title	Category	L	T	P	Credit
CG23CP11	Mobile Application Development Lab	Practical	-	-	75	3

Preamble

This course provides insight on mobile application development using Android SDK. It focuses on android platform, layouts, activities, data binding, views and menus for mobile application development.

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 components in Android mobile application development.	K2
CLO2	Apply android layouts, activities, data binding, views and menus for mobile application development.	K3
CLO3	Demonstrate android platform components to develop simple mobile applications.	K3
CLO4	Analyze problems and create Android applications with multiple activities and data connectivity.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Mobile Application Development Lab - CG23CP11 (75 Hrs)

List of Exercises

- Implementing activities using intents.
- Implementing UI components using various view layouts.
- Develop a simple application using Button, Text Viewand Edit Text.
- Exercise with Radio Group, Buttonand Check Box for user input.
- Exercise using Progress Bar view and Spinner View.
- Exercise using Image View and Text View to display dynamic content.
- Exercise on saving and loading user preferences using SharedPreferences.
- Exercise by adding animation and transitions between activities
- Create SQLite Databases using a DBAdapter helper class.
- Perform CRUD (Create, Read, Update, Delete) operations on the database.
- Develop an application that uses the Notification Manager.

- Create an Android application to send and receive SMS.
- Develop an Android application to send and receive e-mails.
- Create a stopwatch application utilizing Android services.
- Exercise using Action Bar and menus, including adding and handling menu items.

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designer

- Mrs. D. Suganthi

Course Code	Course Title	Category	L	T	P	Credit
CG23CP12	Web Application Development Lab	Practical	-	-	75	3

Preamble

This course provides hands-on experience in developing dynamic web applications using PHP, MySQL, Node.js and ReactJS. The focus is on applying theoretical concepts to real-world web development.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the development of web pages using PHP, focusing on data passing, string and array manipulation.	K2
CLO2	Implement file handling, session management and cookies to maintain state in web applications.	K3
CLO3	Apply the components of PHP / MySQL for web development.	K3
CLO4	Create server-side applications using Node.js and design interactive user interfaces with ReactJS.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Web Application Development Lab - CG23CP12 (75 Hrs)

List of Exercises

- Develop PHP scripts with variables, operatorsand control structures (if, loops).
- Pass data between pages using GET and POST methods.
- Format and validate form variables in PHP.
- Manipulate strings with functions like concatenation, lengthand search.
- Create and manage arrays, including indexing and iteration.
- Implement file-handling operations like reading, writingand file permissions.
- Use PHP sessions and cookies to maintain user state and preferences.
- Perform CRUD operations in MySQL with PHP.
- Set up Node.js and create simple web applications.

- Build HTTP services in Node.js to handle requests and responses.
- Create interactive UIs and manage state within React components.
- Handle events like clicks and form submissions in React.

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designer

- Dr. J. Viji Gripsy

Course Code	Course Title	Category	L	T	P	Credit
CG21SBP3	Artificial Intelligence and Machine Learning Lab	Practical	-	4	41	2

Preamble

The lab course is intended to explore AI methods and apply machine learning algorithms to solve classification, prediction and clustering problems.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding python libraries for artificial intelligence and machine learning.	K1
CLO2	Demonstrate AI methods heuristics, gaming, searching text using python.	K2
CLO3	Apply scikit-learning Python API for machine learning prediction, classification and clustering problem.	K3
CLO4	Demonstrate tensor flow to solve problem using deep learning.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Artificial Intelligence and Machine Learning Lab -CG21SBP3

(41 Hrs)

List of Exercises

- Generating All Possible Sequences of Steps in a Tic-Tac-Toe Game
- Tic-Tac-Toe Static Evaluation with a Heuristic Function
- Finding the Shortest Path to Reach a Goal
- Finding the Shortest Path Using BFS
- Stock Price Prediction with Quadratic and Cubic Linear Polynomial Regression with Multiple Variables
- Illustrating the K-nearest Neighbor Classifier Algorithm in scikit-learn
- Prediction with the k-nearest neighbors classifier
- Calculating the Entropy, Precision, Recall, F1 Score and confusion matrix
- K-means Clustering of Sales Data in scikit-learn
- Written Digit Detection with Deep Learning

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designer

- Mrs. J. Mythili

Course Code	Course Title	Category	L	T	P	Credit
CG20AC3	Internet of Things	Theory	Self Study			5

Preamble

This course provides knowledge on the architecture of Internet of Things and IoT functions. It enables the students to know Arduino microcontroller IDE, design and implementation of IoT circuits.

Internet of Things - CG20AC3

Unit I

Introduction to IOT - Enabling technologies of IOT - AI and Machine Learning - Physical and logical design of IoT - IOT Reference Architecture - IOT Functional Architecture - IoT levels and deployment templates - Application domains of IoT: Home automation - Environment - Energy - Industry - Agriculture - Transportation - Health care & Lifestyle.

Unit II

Fundamentals of Electronics: Conductors and Semiconductors - Electric Charge, Resistance, Current and Voltage - Resistors - Capacitors, Diodes, LED, Potentiometer, circuit boards - Analog and digital circuits - Microcontrollers - Electronic Signals - A/D and D/A Conversion - Pulse Width Modulation

Unit III

Arduino IDE: Installation and Set-up - Programming Fundamentals with C using Arduino IDE Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops - Using Arduino C Library functions for Serial, delay and other invoking functions.

Unit IV

Working with Arduino: LED and Switch - Data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor -Working with humidity sensor - Working with IR Sensor

Unit V

Visual Output: Connecting and using LEDs - Adjusting the Brightness of an LED - Adjusting the Color of and LED - Sequencing Multiple LEDs: Creating a bar graph - Displaying Images on an LED matrix.

Text Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Arshdeep Bahga, Vijay Madisetti	Internet of Things: A Hands-On Approach (Unit I)	Universities Press	2015, 1st Edn.
2	Boris Adryan, Dominik Obermaier, Paul Fremantle	The Technical Foundations of IoT (Unit II)	Artech Houser Publishers	2017, 1st Edn.

3	Michael Margolis	Arduino Cookbook (Unit III, IV, V)	O'Reilly Media	2012, 2nd Edn.

Reference Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Simon Monk	Programming Arduino	Mc Graw Hill	2012, 1st Edn.
2	Charles Platt	Make Electronics - Learning by discovery	O'Reilly Media	2015, 1st Edn.
3	CunoPfister	Getting Started with the Internet of Things	Maker Media	2011, 1st Edn.

Course Designer

- Mrs. J. Mythili

Course Code	Course Title	Category	L	T	P	Credit
CS21AC4	Cryptography and Network Security	Theory	Self Study			5

Preamble

This course provides theoretical knowledge on cryptography and network security. It also covers various cryptographic techniques, authentication and security issues in networks.

Cryptography and Network Security - CS21AC4

Unit I

Introduction to the Concepts of Security: The need for security - Security Approaches - Principles of Security - Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text - Substitution Techniques - Transposition Techniques.

Unit II

Encryption and Decryption -Symmetric and Asymmetric Key Cryptography - Steganography Key - Range and Key Size - Possible Types of Attacks. Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes - An overview of Symmetric Key Cryptography - DES - Blowfish - AES.

Unit III

Computer-based Asymmetric Key Cryptography: Brief History of Asymmetric Key Cryptography - An overview of Asymmetric Key Cryptography - The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together - Digital Signatures - Knapsack algorithm.

Unit IV

Public Key Infrastructure: Digital Certificates, Private Key Management - The PKIX Model, Public Key Cryptography Standards - XML - PKI and Security.

Unit V

Internet Security Protocols: Basic Concepts - Secure Socket Layer - SHTTP - Secure Electronic Transaction - E-mail Security - Security in GSM - Security in 3G.

Text Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Atul Kahate	Cryptography and Network Security	Mc Graw Hill Education	2019, 4th Edn.

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	William Stallings	Cryptography and Network Security - Principles and practice	Pearson Education	2023, 8th Edn.
2	Neal Krawetz	Introduction to Network Security	Cengage Learning	2007, 1st Edn.
3	Bernard Menezes	Network Security and Cryptography	Cengage Learning	2010, 1st Edn.

Course Designer

- Mrs. J. Mythili