CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

NATIONALLY ACCREDITED WITH "A" GRADE BY NAAC

TIRUCHIRAPPALLI-18

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.Sc Computer Science with Cognitive Systems

2024 - 2025 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

VISION

To create an ambience for a quality academic erudition which drives technologically adept, innovative and globally competent graduates with ethical values

MISSION

- To have a breath of knowledge across the subject areas of Computer Science
- To professionally enrich the students for successful career in Academia, Industry and Research
- To promote and inculcate ethics and code of professional practice among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO 1	**LEARNING ENVIRONMENT** To facilitate value- based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO 2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO 3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO 4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude to wards the development of the nation.
PEO 5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUT COMES FOR

B.Sc Computer Science / B.Sc Computer Science with Cognitive Systems

/BCA/ B.Sc Information Technology

PO NO.	**On completion of** B.Sc Computer Science / B.Sc Computer Science with Cognitive Systems /BCA/B.Sc Information Technology Programme**, The students will be able to**
PO 1	**Academic Skills & Social Responsibility** Apply Computing, Mathematical and Scientific Knowledge in Various disciplines by under standing the concerns of the society.
PO 2	**Critical Thinking and Innovative Progress** Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO 3	**Personality Development** Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO 4	**Lifelong Learning** Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO 5	**Creativity and Holistic Approach** Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES FOR
B.Sc COMPUTER SCIENCE WITH COGNITIVE SYSTEMS

PSO NO.	The students of B.Sc Computer Science with Cognitive Systems Will be able to	Pos Addressed
PSO1	Gain knowledge in the core topics of Computer Science and to develop an Equal appreciation of current industry standards.	PO1,PO2
PSO2	Equip them as industry ready students and an entrepreneur with significant knowledge on digital ecosystem that provide values to business needs in the area of IT Infrastructure and IT Application, Maintenance & Service Support.	PO2, PO3, PO4, PO5
PSO3	Apply appropriate techniques and skills in various domains of computer Science to solve real world problems.	PO1, PO2, PO4,
PSO4	Create awareness on current issues and latest trends in technological development and there by implement innovative ideas and solutions to existing problems in society.	PO2, PO4, PO5
PSO5	Implement in dependent projects of their own choice using latest tools and also work as an effective team member to attain the predefined goals.	PO1, PO3, PO5

CIA COMPONENTS

Theory Courses

Component	Marks
Attendance	03
Library	03
Seminar/Quiz/ Assignment	04
CIA- I	7.5
CIA - II	7.5
Total	**25**

Practical Courses

Component	Marks
Observation	05
Record	10
Continuous Performance in Practical	10
Model Practical	15
Total	**40**

Theory & Practical Courses (50 marks)

Component	Marks
CIA Tests- Theory	2 x 5 =10
Record Note	05
Internal Practical Exam by External Practical Examiner	30
Viva Voce	05
TOTAL	**50**

Cauvery College for Women (Autonomous)

PG & Research department of Computer Science

B.Sc Computer Science with Cognitive Systems

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS – LOCF)

(For the Candidates admitted from the Academic year 2024-2025 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. /week	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Language Course-I (LC)	பொதுதமிழ்-I	23ULT1	6	3	3	25	75	100
			Hindi ka Samanya Gyanaur Nibandh	23ULH1						
			Poetry, Grammer and History of Sanskrit Literature	23ULS1						
			Foundation Course: Paper I - French I	23ULF1						
	II	English Language Course- I (ELC)	General English -I	23UE1	6	3	3	25	75	100
	III	Core Course – I (CC)	Operating Systems(T & P)	22UCG1CC1	4+2	6	2	50*	50*	100
		Core Practical - I (CP)	Introduction to Worksheet(P)	22UCG1CC1P	2	2	3	40	60	100
		Core Course – II (CC)	IT Cognition	22UCG1CC2	3	3	3	25	75	100
		First Allied Course- I (AC)	Applied Mathematics	22UCG1AC1	5	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal - Value Education	23UGVE	2	2	-	100	-	100
				Total	**30**	**22**				**700**
II	I	Language Course-II(LC)	பொதுதமிழ்- II	23ULT2	6	3	3	25	75	100
			Hindi Literature &Grammar–II	22ULH2						
			Prose, Grammar and History of Sanskrit literature	23ULS2						
			Basic French-II	22ULF2						
	II	English Language Course-II(ELC)	General English - II	23UE2	6	3	3	25	75	100
	III	Core Course– III(CC)	Java Programming	23UCG2CC3	4	4	3	25	75	100
		Core Practical-II(CP)	Java Programming (P)	23UCG2CC2P	2	2	3	40	60	100
		Core Course– IV(CC)	Information Technology Infrastructure Library	22UCG2CC4	2	2	3	25	75	100
		First Allied Course–II(AC)	Statistics	22UCG2AC2	4	3	3	25	75	100
		First Allied Course–III(AC)	Operations Research	22UCG2AC3	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-II (AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100
				Total	**30**	**22**				**800**

T & P: ESE: 50 (Theory Exam), CIA: 50* (Practical: 40 + Theory :10)

III	I	Language Course-III (LC)	பொதுதமிழ்-III	23ULT3	6	3	3	25	75	100
			Hindi Literature & Grammar - III	22ULH3						
			Drama, Grammar and History of Sanskrit Literature	23ULS3						
			Intermediate French - I	22ULF3						
	II	English Language Course-III (ELC)	Learning Grammar Through Literature- I	23UE3	6	3	3	25	75	100
	III	Core Course – V (CC)	Computer Networks	23UCG3CC5	5	4	3	25	75	100
		Core Practical – III (CP)	Computer Networks (P)	23UCG3CC3P	2	2	3	40	60	100
		Core Course-VI (CC)	Infrastructure Management	23UCG3CC6	5	4	3	25	75	100
		Second Allied Course- I (AC)	Digital Computer Fundamentals	22UCG3AC4	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-III (AECC)	Health and Wellness	24UGHW	2*	1		100		100
		Generic Elective Course- I (GEC)	Introduction to NCC	24UNC3GEC1	2	2	2	-	100	100
			Office Automation (P)	22UCG3GEC1P			3	40	60	
			Basic Tamil – I	22ULC3BT1				25	75	
			Special Tamil – I	22ULC3ST1						
				Total	**30**	**22**				**800**

*** Health and Wellness shall be outside instruction hours**

IV	I	Language Course - IV (LC)	பொதுதமிழ் - IV	23ULT4	6	3	3	25	75	100
			Hindi Literature & Functional Hindi	22ULH4						
			Alankara, Didactic and Modern Literatures and Translation	23ULS4						
			Intermediate French - II	22ULF4						
	II	English Language Course – IV (ELC)	Learning Grammar Through Literature- II	23UE4	6	3	3	25	75	100
	III	Core Course – VII (CC)	Database Management Systems (T&P)	23UCG4CC7	4+2	5	2	50*	50*	100
		Second Allied Course- II (AP)	Digital & Microprocessor (P)	22UCG4AC5P	3	2	3	40	60	100
		Second Allied Course –III (AC)	Microprocessor & Microcontrollers	22UCG4AC6	5	4	3	25	75	100
	IV	Generic Elective Course- II (GEC)	Specialization in Army	24UNC4GEC2	2	2	2	-	100	100
			Multimedia (P)	22UCG4GEC2P			3	40	60	
			Basic Tamil – II	22ULC4BT2				25	75	
			Special Tamil – II	22ULC4ST2						
		Ability Enhancement Compulsory Course-IV (AECC)	Campus to Corporate	24UGCM	2	1	-	100	-	100
				Total	**30**	**20**				**700**

30 Days INTERNSHIP during Semester Holidays

V	III	Core Course – VIII (CC)	Software Testing (T&P)	23UCG5CC8	3+2	4	2	50*	50*	100
		Core Course- IX (CC)	Introduction to Digital Technologies (T&P)	23UCG5CC9	4+2	5	2	50*	50*	100
		Core Course – X (CC)	Client Relationship Management (T&P)	23UCG5CC10	4+2	5	2	50*	50*	100
		Core Course –XI (CC)	Virtualization & Cloud	22UCG5CC11	4	4	3	25	75	100
		Discipline Specific Elective – I (DSE)	A. Computer Organization & Architecture	22UCG5DSE1A	5	4	3	25	75	100
			B. Process Management	22UCG5DSE1B						
			C. Computer Graphics	22UCG5DSE1C						
		Internship	Internship	24UCG5INT	-	2	-	25	75	100
	IV	Ability Enhancement Compulsory Course- V (AECC)	UGC Jeevan Kaushal - Professional Skills	22UGPS	2	2	-	100	-	100
		Skill Enhancement Course – I (SEC)	Virtualization & Cloud (P)	22UCG5SEC1P	2	2	3	40	60	100
	Total				**30**	**28**				**800**
VI	III	Core Course –XII (CC)	Python Programming (T & P)	23UCG6CC12	4+2	5	2	50*	50*	100
		Core Course –XIII (CC)	Data Structures & Algorithms	23UCG6CC13	6	5	3	25	75	100
		Core Course –XIV (CC)	Cyber Security	22UGCS	5	4	3	25	75	100
		Discipline Specific Elective – II (DSE)	A. Artificial Intelligence	22UCG6DSE2A	5	4	3	25	75	100
			B. Network Security	22UCG6DSE2B						
			C. Big Data & IoT	22UCG6DSE2C						
		Project	Project Work	22UCG6PW	5	4	-	-	100	100
	IV	Skill Enhancement Course – II (SEC)	HTML, CSS, JavaScript (P)	22UCG6SEC2P	2	2	3	40	60	100
		Ability Enhancement Compulsory Course- VI- (AECC)	Gender Studies	22UGGS	1	1	-	100	-	100
	V	Extension activity		22UGEA	0	1	0	-	-	-
	Total				**30**	**26**				**700**
	Grand Total				**180**	**140**				**4500**

T & P: ESE: 50 (Theory Exam), CIA: 50* (Practical: 40 + Theory :10)

Courses & Credits for C.Sc. with Cognitive Systems (2024 - 2025)

	Course	No. of Courses	Credits	Total Credits
I	Tamil/ Other Language	4	12	12
II	English	4	12	12
III	Core (Theory& Practicals)	17	66	98
	Project Work	1	4	
	Internship	1	2	
	First Allied	3	9	
	Second Allied	3	9	
	DSE	2	8	
IV	GEC	2	4	17
	SEC	2	4	
	AECC-I Universal Human Values	1	2	
	AECC-II Environmental Studies	1	2	
	AECC-III Health and Wellness	1	1	
	AECC-IV Campus to Corporate	1	1	
	AECC-V Professional Skills	1	2	
	AECC-VI Gender Studies	1	1	
V	Extension Activities	-	1	01
Total		45	140	140

Question Paper Pattern

Question Paper Pattern for Theory Courses with 75 marks

BSc Degree Examination

Time: 3 Hrs **Max.Marks:75**

Section A

Answer ALL Questions (20 * 1=20)

1 to 5. Choose the best Answer
6 to 10. Fill in the Blanks
11 to 15.Say True or False
16 to 20.Answer in one or Two sentences

Section- B

Answer ALL Questions (5*5=25)

21 (a) or (b)
22 (a) or (b)
23 (a) or (b)
24 (a) or (b)
25 (a) or (b)

Section- C

Answer any THREE questions (3*10=30)

26.
27.
28.
29.
30.

Question Paper Pattern for Theory & Practical Courses with 50 marks

BSc Degree Examination

Time: 2 Hrs **Max.Marks:50**

Section A

Answer ALL Questions (10 * 1=10)

1 to 10. Choose the best Answer

Section- B

Answer ALL Questions (5*3=15)

11 (a) or (b)
12 (a) or (b)
13 (a) or (b)
14 (a) or (b)
15 (a) or (b)

Section- C

Answer any FIVE questions (5*5=25)

16.
17.
18.
19.
20.
21.
22.
23.

SEMESTER I

Semester I	Internal Marks: 50			External Marks:50	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**		**CREDITS**
			T	**P**	
22UCG1CC1	**OPERATING SYSTEMS (T & P)**	**CORE**	**4**	**2**	**6**

Course Objective

- To recognize the concepts and principles of Operating Systems
- To inculcate knowledge on client and server OS
- To learn how to install, configure, deploy, manage and maintain the Operating System

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Recall and Understand the fundamentals of computer and Operating Systems	K1,K2
CO2	Analyze and Categorize the components of Operating Systems	K3,K4
CO3	Examine and Explain the performance of Operating Systems services	K4,K5
CO4	Identify and Apply the appropriate methods or instructions to manage the resources	K3, K5
CO5	Compare and Interpret the functionalities of Operating Systems	K4,K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2	3	3	2	3	2
CO2	3	3	3	3	3	3	3	3	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3"– Substantial (High) Correlation "-" indicates there is no Correlation

Syllabus:

Theory:

Unit	Content	Hours	COs	Cognitive Level
I	**Introduction to Operating Systems** Computer Basics: Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working **Hardware Basics:** Central Processing Unit – I/O Devices-Memory Devices- Secondary storage devices **Operating System Basics:** OS Definition, Functions, OS as a Resource Manager, Types of OS, Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Process Management :**Basic Concepts, Process Scheduling, Operations on Processes, Inter-process Communication, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Memory Management :** Memory Management Strategies, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management, Demand Paging, Page Replacement Techniques and Algorithms	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Storage Management :** File Concept, Access Methods, Directory Structure, Protection, Implementing File Systems, File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Operating Systems :** **Introduction to Linux**: Versions, Components, Features; Installation of Linux OS, Managing Directories, Managing Files **Introduction to Windows**: Versions, GUI Components, Features; Installation of Client OS and Server OS, Installation of Roles and	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

	Features, Managing Users and Groups, Managing Devices and Printers, Storage Management, Managing and Monitoring of Server, Backup & Restoration			
VI	**Self Study for Enrichment** **(Not to be included for End semester Examinations)** Installation of various OS – create and run virtual machine with Hyper-V – Configure IPv4 and IPv6-Group policy management-virtualization in cloud computing	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne. (2009). *Operating System Concepts*. (7th Edition).Wiley.

Web References:

1. Operating Systems - Silberschatz, Galvin
2. Operating System – Neso Academy

Practical:

List of Exercises

1. Installation of Linux OS (CentOS)
   - Explain the steps to Install the Linux OS
   - Demonstrate Working with Directories in Linux (*pwd, cd, absolute and relative paths, ls, mkdir, rmdir, file, touch, rm, cp, mv, rename, head, tail, cat, tac, more, less, strings, chmod*)
   - Demonstrate Working with Files in Linux (*ps, top, kill, pkill, bg, fg, grep, locate, find, date, cal,uptime, whoami, finger, uname, man, df, du, free, whereis, which*)
2. Installation of Windows Client OS
   - Explain the steps to Install the Client OS
   - Install a Virtual Machine with Windows Client OS
3. Managing Windows Client OS
   - Explain the steps to Create Users and Groups
   - Demonstrate the usage of Devices and Printers
   - Demonstrate the usage of Disk Management Console
4. Installation of Windows Server OS
   - Explain the steps to Install the Server OS
   - Install a Virtual Machine with Windows Server OS
5. Managing Windows Server OS
   - Demonstrate how to Install Roles and Features
   - Demonstrate the Usage of Server Storage Management
   - Explain the various Management and Monitoring requirements
   - Explain the Backup Types and steps to take Backups

Resources:

Lab Requirements: Linux

- CentOS Linux ISO

Windows

- Windows 10 Evaluation – 90 Days
- Windows Server 2019 Evaluation – 180 Days
- Windows Server 2016 Evaluation – 180 Days

CentOS Linux

- Installation Guide
- CentOS Overview
- Basic CentOS Linux Commands
- File and Folder Management

Windows 10

- Windows 10 – Tutorials Point
- Windows 10 Tutorial

Windows Server 2016

- Windows Server – Channel 9
- Windows Server Administration for Beginners
- Windows Server 2016 Tutorial Step by Step Full
- Windows Server 2016 Administration Full Course
- Windows Server deployment, configuration, and administration

Pedagogy

Chalk & Talk, PowerPoint Presentation, Demonstration, e-Content

Course Designer

TCS

Semester I	Internal Marks:40			External Marks:60
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG1CC1P	**INTRODUCTION TO WORKSHEET (P)**	**CORE**	**2**	**2**

Course Objective

- To perform basic calculations and formatting
- To inculcate the knowledge of Macros
- To create applications using VBA code

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate the use of basic functions, LOOKUPS and Formatting	K2
CO2	Build Applications using VBA code	K3
CO3	Write Macros	K3
CO4	Implement data visualization	K3
CO5	Handle large amount of data using Pivot table	K3

Mapping of CO with PSO and PO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	2	3	2
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3	2	2	2
CO5	3	3	3	3	2	3	2	2	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no correlation.

List of Exercises

EXCEL

1. Excel worksheet for Formatting, Math function and Text function
2. Excel worksheet for Graph Function
3. Excel worksheet for VLOOKUP, HLOOKUP and other LOOKUPS
4. Excel worksheet for Pivot

VBA

5. Unhide all worksheets at one Go
6. Hide All Worksheets except the Active Sheet
7. Protect and Unprotect All worksheets in a Workbook
8. Save each Worksheets as a separate PDF
9. Change the Letter Case of Selected Cells to Upper Case
10. Sort Data by Single and Multiple Columns
11. Highlight Blank Cells with VBA

Software Essentials: Microsoft office 2007

Web References

1. https://www.excel-exercise.com/beginner/
2. https://trumpexcel.com/excel-macro-examples/

Pedagogy

Power point Presentation, Demonstration

Course Designer

TCS

Semester I	Internal Marks:25			External Marks:75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG1CC2	**IT COGNITION**	**CORE**	**3**	**3**

Course Objective

- To enable the learners to understand the concepts of cognitive process
- To empower the learners with the skills required for virtual collaboration and cultural sensitivity

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Outline and Construction of Mental Activity	K1,K2
CO2	Summarize and Experiment with the Functions of Brain	K2,K3
CO3	Interpret and make use of Mental Representation	K2,K3
CO4	Classify and Explain the Sensory Activity	K4,K5
CO5	Build and Analyze the Intellectual ability	K3,K4

Mapping of CO with PSO and PO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2	2	2	2	2	1
CO2	2	2	3	3	2	3	3	2	2	2
CO3	2	3	3	3	3	2	3	3	2	2
CO4	1	2	2	2	2	2	3	2	2	2
CO5	2	3	3	3	3	3	3	3	2	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" – Indicates there is no Correlation

Syllabus

Unit	Content	Hours	COs	Cognitive Level
I	**Introduction to Cognition**: Meaning, Cognitive processes, Development of Cognitive psychology.	7	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Perceptual Processes of Attention**: Divided attention, Selective Attention, Visual attention and Auditory attention. Consciousness: Varieties, Subliminal Perception. Visual Perception Perceptual Organizational Processes, Multisensory interaction and Integration: Synthesis, Comparing the senses, Perception and Action.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Memory- Working Memory**: Factors affecting the capacity of working Memory. Long Term Memory: Encoding and Retrieval in Long Term Memory, Autobiographical Memory. Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization. Metacognition: Meta memory, TOT, Meta comprehension.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**The Characteristics of Mental Images** – Imagery and Rotation, Imagery and Distance, Imagery and Shape, Imagery and interference, Imagery and Ambiguous Figures, Imagery and other vision -like Processes. **Cognitive Maps**: Background information about cognitive maps, Cognitive Maps and Distance, Cognitive Maps and Shape, Cognitive Maps and relative Position.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Future Skills:** Critical thinking, Adaptive thinking, Cognitive Load Management, Design thinking, Virtual Collaboration and Cultural Sensitivity.	8	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** (**Not to be included for End Semester Examination**) Language Production And Bilingualism: Speaking – Producing a word, producing a sentence, speech errors, producing disclosure. Writing – Cognitive model of writing, planning the writing assignment. Bilingualism and Second Language Acquisition – Background and advantages of bilingualism.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Suggested Readings

1. Matlin, M.W. (2003). *Cognition* (5th Edition). Wiley Publication.
2. Riegler, B.R., Reigler,G.L. (2003).*Cognitive Psychology–Applying the Science of Mind* (2nd Edition). Pearson Education.
3. Benjafield, J.G. (2007). *Cognition* (3rd Edition). Oxford University Press.
4. Goldstein, B.E. (2008).*Cognitive Psychology* (2nd Edition). Wadsworth.

Web References

1. https://sjsu.edu/people/mark.vanselst/courses/p135/s1/Kellogg_c1_fall2013.pdf
2. https://jvapartners.com/problem-solving-and-decision-making-in-a-vuca environment/
3. https://plato.stanford.edu/entries/critical-thinking/

Pedagogy

Chalk & Talk, PowerPoint Presentation

Course Designer

TCS

FIRST ALLIED COURSE –I (AC)

APPLIED MATHEMATICS

(For B.Sc Computer Science with Cognitive Systems)

(2022-2023 and Onwards)

Semester I	**Internal Marks:25**		**External Marks:75**	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCG1AC1	**APPLIED MATHEMATICS**	**ALLIED**	**5**	**3**

Course Objective

- **Apply** the basic concepts of Differentiation, Integration and their applications.
- **Compute** mathematical quantities using Numerical methods.
- **Explore** fundamental concepts in graph theory.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	**CO Statement** On the successful completion of the course, students will be able to	**Cognitive Level**
CO1	Remember and recall the basic concepts of applied mathematics.	**K1**
CO2	Illustrate the various notions in the respective streams.	**K2**
CO3	Apply the different terminologies of applied mathematics	**K3**
CO4	Classify the solutions of mathematical problem using peculiar techniques.	**K4**
CO5	Examine the solutions of a mathematical problem.	**K4**

Mapping of CO with PO and PSO

COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	3	3	3	3	3	3	2	3
CO2	3	2	3	3	3	3	3	3	3	2
CO3	3	2	3	3	3	3	3	3	2	2
CO4	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Matrices** Matrix – Special types of matrices – Scalar multiplication of a matrix – Equality of matrices – Addition of matrices – Subtraction – Multiplication of Matrices – Inverse matrix– Relation between adjoint and inverse matrices – Solution of simultaneous equations – Rank of a matrix – A system of m homogeneous linear equations in n unknowns – System of non-homogeneous linear equations – Eigen values and Eigenvectors – Similar matrices – Cayley-Hamilton Theorem (proof not needed) – Simple applications only	15	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
II	**Differentiation & Integration** Maxima and Minima (Problems Only) –Points of inflexion. Type i: $\int \frac{dx}{ax^2+bx+c}$,Type ii: $\int \frac{lx+m}{ax^2+bx+c}\,dx$ – Integration of Irrational functions: Case (ii) Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}}$	15	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
III	**Differential Equations** Linear Differential Equation with constant coefficients – The Operators D and D^{-1} – Particular Integral – Special methods of finding P.I.: X is of the form (a) $e^{\alpha x}$ (b) $\cos\alpha x$ or $\sin\alpha x$, where α is a constant (c) x^m (a power of x), m being a positive integer (d) $e^{ax}V$, where V is any function of x	15	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
IV	**Numerical Differentiation and Integration** **Introduction:** Newton's forward difference formula to compute derivatives - Newton's backward difference formula to compute derivatives. (Simple Problems Only) The Trapezoidal rule (excluding Truncation error in the Trapezoidal formula) – Simpson's rule (Simple Problems Only)	15	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4

V	**Graph Theory** Introduction – Definition of Graphs – Applications of Graphs – Finite and infinite graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex, and Null Graph. **Path and Circuits** Isomorphism – Subgraphs – Walks, Paths, and Circuits – Connected Graphs, Disconnected Graphs, and Components – Euler graphs	15	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
VI	**Self-Study for Enrichment** **(Not included for End Semester Examination)** Symmetric matrix– Skew symmetric matrix – Hermitian and skew Hermitian matrices –Concavity and Convexity – Linear equation – Simpson's 3/8 rule –Hamiltonian Paths and Circuits.	-	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4

Text Books

1. Manichavaschagom Pillay, T.K. Natarajan,T.& Ganapathy, K.S.(2015). *Algebra, Volume II,* S. Viswanathan Pvt Limited.
2. Narayanan, S. & Manicavachagom Pillay, T.K. (2015). *Calculus, Volume I*, S. Viswanathan (Printers & Publishers) Pvt., Ltd.
3. Narayanan, S. & Manichavaschagom Pillay, T.K. (2015). *Calculus, Volume II,* S.Viswanathan (Printers & Publishers) Pvt., Ltd.
4. Narayanan, S. & Manichavaschagom Pillay, T.K. (2015). *Calculus, Volume III,* S.Viswanathan (Printers & Publishers) Pvt., Ltd.
5. Venkataraman, M.K. (Reprint 2007). *Numerical Methods in Science and Engineering,* The National Publishing Company.
6. Narsingh Deo, (2003). *Graph Theory with applications to Engineering and Computer Science,* Prentice Hall of India Private Limited.

Chapters and Sections

UNIT–I Chapter 2: Sections 1 to 5, 7, 8, 10 to 16 [1]

UNIT II Chapter V: Sections 1.1 to 1.5, 2 [2]

Chapter 1: Sections 7.3, 8 (CASE II) [3]

UNIT-III Chapter 2: Sections 1 to 4 [4]

UNIT-IV Chapter IX: Sections 1-3, 8,10 [5]

UNIT-V Chapter 1: Sections 1.1 to 1.5 [6]
Chapter 2: Sections 2.1, 2.2, 2.4 to 2.6 [6]

Reference Books

1. Singaravelu, A. (2003). *Allied Mathematics,* A. R. Publications.
2. Vital, P.R. (2014). *Allied Mathematics,* Margham Publications, Chennai.
3. Sastry, S. S. (2018). *Introductory Methods of Numerical Analysis,* PHI Learning Private Limited.
4. Arumugam, S. & Ramachandran. S. (2006). *Invitation to Graph Theory,* Sci Tech Publications (India) Pvt Ltd., Chennai.

Web Links

1. **https://youtu.be/rowWM-MijXU**
2. **https://youtu.be/TQvxWaQnrqI**
3. **https://youtu.be/pvLj1s7SOtk**
4. **https://youtu.be/rYq319AOT9E**
5. **https://youtu.be/RTX-ik_8i-k**
6. **https://youtu.be/s5KZw1EpBEo**

Pedagogy

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

SEMESTER II

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
23UCG2CC3	**JAVA PROGRAMMING**	**CORE**	**4**	**4**

Course Objective

- To provide the basic OOPs concepts in Java
- To comprehend building blocks of OOPs language, inheritance, package and interfaces
- To identify exception handling methods in Java
- To develop GUI based desktop application in project-based learning

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand OOPs concepts.	K1
CO2	Demonstrate the concept of Object Oriented programming through Java	K2
CO3	Apply the concept of interface, exceptions and threads to develop Java programs	K3
CO4	Develop Java program using Collection Interfaces	K4
CO5	Explain the Java program with Collection Interfaces and Classes	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3	2	3	2	3	2
CO2	3	3	3	3	3	2	3	2	3	3
CO3	2	3	3	3	3	2	3	2	3	3
CO4	2	3	3	3	3	2	3	2	3	2
CO5	2	3	3	3	2	2	3	2	3	3

"1"- Slight (Low) Correlation
"2"- Moderate (Medium) Correlation
"3" - Substantial (High) Correlation
"-" - Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Fundamentals of Object-Oriented Programming:** Basic Concepts of Object-Oriented Programming - Benefits and Applications of OOP. **Overview of Java Language:** Java Program Structures, Statements – **Constants, Variables and Data Types:** Constants- Variables – Data Types – Declaration of Variables – Giving Values to Variables – Scope of Variables – Symbolic Constants- Type Casting.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Operators and Expressions:** Introduction - Arithmetic Operators-Relational Operator - Logical Operator - Assignment Operator-increment and decrement Operator-Conditional Operator - Bitwise Operator-Special Operator - **Decision Making and Branching:** Introduction - Decision making with if statement - Simple if statement -The if ..else Statement-Nesting of if …else statements - The switch statement - The Conditional Operator(?:Operator) -**Decision Making and Looping :** While, Do, For Statement, Jump in Loops, Return Statement.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Classes, Objects and Methods**: Defining a Class – Fields and Methods Declaration - Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – **Inheritance:** Extending a Class – Overriding Methods – Abstract Methods and Classes – **Arrays, Strings and Vectors**: Creating Arrays – One and two Dimensional Arrays - Strings. **Interfaces: Multiple Inheritance:** Introduction - Defining Interfaces - Extending Interfaces-Implementation Interfaces - Accessing Interfaces Variables	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Packages**: Introduction - Java Packages - Using System Packages-Naming conventions - Creating packages - Accessing a package - Using a Package - Adding a class to a package - **Multithreaded Programming:** Creating Threads – Extending the Thread Class – Thread- Life Cycle of Thread-Using Thread Method - Thread Priority – Synchronization – **Managing Errors and Exceptions:** Introduction - Types of Errors - Exceptions-Syntax of Exception Handling code-	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

V	**The Collections Framework: The Collection Interfaces:** Collection Interface, List Interface, Set Interface, Sorted Set Interface– **The Collection Classes:** Array List Class, HashSet Class, Tree Set Class – Stack class	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not to be included for End Semester Examination)** History of Java - Installing and Configuring Java- Comment Line Arguments – Enumerated Types - Finalizer Methods. **Managing Input/Output Files in Java:** Stream Classes **–** Byte Stream Classes – Character Stream Classes – Creation of Files – Reading/Writing Characters – Reading/Writing bytes.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

E. Balagurusamy (2019). *Programming with Java.* McGraw Hill Education (India) Pvt. Ltd. – Edition - 6

Reference Book

Herbert Schildt. (2019). *The Complete Reference JAVA*. (11th Edition). McGraw Hill Education (India) Pvt.Ltd.

Web References

1. https://www.slideshare.net/sreedharchowdam1/java-notes-56309340
2. https://sites.google.com/a/rcoe.co.in/computer-programming-ii-java/dashboard/java-notes
3. https://slideplayer.com/slide/13598881/

Pedagogy

Chalk and Talk, Power Point Presentation, Demonstration, e-Content

Course Designer

Dr. S. Latha

Semester II	Internal Marks: 40			External Marks:60
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
23UCG2CC2P	**JAVA PROGRAMMING (P)**	**CORE**	**2**	**2**

Course Objective

- To demonstrate the basic programming components in Java
- To learn how to apply the Object Oriented concepts in Java to develop applications
- To design and develop GUI applications

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate and implement the fundamental OOPs concept	K1,K2
CO2	Apply the reusability and develop the Java program	K3
CO3	Analyze the working of exception handling and threads	K4
CO4	Illustrate of the Collection concept to design Java program	K4
CO5	Design the Java program using Collection classes and interfaces	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	3	2	3	2	3	2
CO2	3	2	2	3	3	2	3	2	3	3
CO3	2	3	3	3	3	2	3	2	3	3
CO4	2	3	3	3	3	2	3	2	3	2
CO5	2	3	3	3	2	2	3	2	3	3

"1"- Slight (Low) Correlation
"2"- Moderate (Medium) Correlation
"3" - Substantial (High) Correlation
"-" - Indicates there is no Correlation

List of Exercises

1. Write a Java Program to overload the constructors and instantiate its object.
2. Write a Java program to practice using String class and its methods.
3. Write a Java Program to implement inheritance and demonstrate use of method overriding.
4. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
5. Write a program to demonstrate use of implementing and extending interfaces.
6. Write a Java program to implement the concept of creating packages and importing classes from user defined package.
7. Write a program to implement the concept of Thread Class.
8. Write a program to implement the concept of Exception Handling.
9. Collection Interface
10. Collection Class

Web References

1. https://www.programiz.com/java-programming
2. https://code-exercises.com/
3. https://practity.com/765-2/

Pedagogy

Power Point Presentation and Demonstration.

Course Designer

Dr. S. Latha

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
22UCG2CC4	**INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY**	**CORE**	**2**	**2**

Course Objective

- To be able to design an Infrastructure Library
- To understand the management principles and its risks in ITIL
- To know the various management practices

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Recall and Rephrase the key concepts of ITIL	K1,K2
CO2	Outline the models of Service Management	K2
CO3	Utilize the various functionalities of Service Management	K3
CO4	Categorize the different types of Management Practices	K4
CO5	Analyze and Explain the Service Management features in Infrastructure Library	K4,K5

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3	2	3	3	3	3
CO2	3	3	3	2	2	3	3	3	3	3
CO3	3	3	3	2	3	2	2	2	3	3
CO4	3	3	3	3	3	3	2	2	3	3
CO5	3	3	2	2	2	2	3	3	2	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
" - " indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction & Key & concepts of Service management to ITIL 4** **Introduction**: IT Service Management in the modern world - About ITIL v4 - The structure and benefits of the ITIL v4 Framework. **Key Concepts of Service Management:** Value and Value Co-Creation, Stakeholders - Products and Services - Service Relationships and Value.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**ITIL 4 Dimension Model of IT Service Management** Organization & People: Information & Technology: Partners & Suppliers: Value Streams & Processes - External factors.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**ITIL Service Value System** Service Value System (SVS) Overview: Opportunity – demand - and Value. Guiding Principles: Focus on value - Think and work holistically - Keep it simple and practical - Optimize and automate - Principle interaction. Service value chain - Continual improvement.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**ITIL Management Practices:** **General Management Practices** Continual improvement - Information Security management - Knowledge Management - Measurement & reporting - Organizational change Management - Portfolio Management - Project Management - Relationship Management - Risk Management - Service Financial Management - Strategy Management - supplier management - Workforce & talent Management. **Technical Management Practices:** Deployment Management - Infrastructure & Platform - Software development.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

V	**ITIL Management Practices: Service management Practices** Availability management - Business analysis Capacity and performance management - Change control - Incident management - IT asset management - Monitoring and event management - Problem management - Release management - Service catalogue management - Service configuration management - Service continuity management - Service design - Service desk - Service level management -Service request management - Service validation and testing.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** (**Not to be included for End Semester Examination**) Foundation Library-Various levels of Service Management-Benefits and risks of Management Protocols.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Recommended Book

ITIL Foundation v4 Edition 2. Published by TSO (The Stationary Office), part of WILLIAMS LEA TAG (2019),AXELOS-GLOBAL BEST PRACTICE-ITIL OFFICIAL PUBLISHER. (Online)

Reference Books

1. *ITIL For Beginners*: The Complete Beginner's Guide to ITIL Edition 2, January 2017.
2. *ITIL for Dummies* Copyright @ 2012 John Wiley & Sons Ltd., Chichester ,West Sussex, England.

Web References:

1. https://www.google.co.in/books/edition/ITIL_Foundation_ITIL/HmsYwQEACAAJ?hl=en
2. https://www.techtarget.com/searchdatacenter/definition/ITIL
3. https://www.axelos.com/certifications/itil-service-management/

Pedagogy

Chalk & Talk, PowerPoint Presentation, Demonstration, e-Content

Course Designer

TCS

Semester II	Internal Marks:25			External Marks:75
COURSECODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
22UCG2AC2	**STATISTICS**	**ALLIED**	**4**	**3**

Course Objective

- **Enable** the short historical development of Statistics.
- **Provide** the knowledge to interpret and solve the statistical problems.
- **Explore** the ideas of statistical tools.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Remember and recall the basic concepts of statistics.	K1
CO2	Illustrate the various notions in the respective stream.	K2
CO3	Apply the different terminologies of statistics.	K3
CO4	Classify the solution of statistical methods using various techniques.	K4
CO5	Explain the solution of statistical problems.	K4

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	2	3	2	2	2	3
CO2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	3	2	2	3	2	2	3	3
CO4	3	2	2	2	2	2	2	2	2	2
CO5	2	2	2	2	3	2	3	1	2	2

"1"–Slight(Low)Correlation¬ "2"–Moderate(Medium)Correlation¬

"3"–Substantial(High) Correlation¬ "-" indicates there is no correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Importance, Functions, Limitations:** Importance - Statistics in States – Statistics in Economics – Statistics in Business –Statistics in Astronomy – Statistics in Education – Statistics in Accounting – Statistics in Research – Statistics in Planning–Statistics in Mathematics – Statistics and the Commonman–Statistics Functions of Statistics–Limitations of Statistics. **Diagrammatic Representation:** Introduction– Advantages–Limitations of a Diagram – Rules for Making a Diagram –Types of Diagram – One Dimensional Diagram – Two dimensional diagram –Three Dimensional Diagram – Pictogram and Cartogram– Selection of a Diagram	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Measures of Central Tendency** Averages–Arithmetic Mean–Median–Mode– Geometric Mean	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Dispersion:** Dispersion–Measures of Dispersion– Coefficients of Dispersion(Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Correlation:** Introduction–Meaning of Correlation– Scatter Diagram–Karl Pearson's Co-efficient of Correlation – Rank Correlation (Derivations not needed and Simple Problems Only). **Linear Regression:** Introduction–Linear Regression– Regression Coefficients–Properties of Regression Coefficients(Derivations not needed and Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Testing the Hypothesis:** Applications of Chi–Square Distribution –Goodness of Fittest– Applications oft-distribution– t-test for Single Mean – t-test for difference of Means – Applications of F-distribution – F-test for Equality of two Population Variances (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Distrust of Statistics–Fallacies in Statistics – Harmonic Mean –Range, interquartile Range– Rank Correlation (Repeated Ranks)– t-Distribution: Paired t-test for difference of means.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Pillai.R.S.N & Bhagavathi (2008).*Statistics Theory and Practice*. S.Chand & Sons, New Delhi.
2. Gupta.S.C. &V.K.Kapoor. (2014). *Fundamentals of Mathematical Statistics*. Sultan Chand&Sons, New Delhi.

Chapters and Sections

UNIT-I	Chapter 1: Pages(12 – 18)[1]
	Chapter 2: Pages(81 – 99)[1]
UNIT-II	Chapter 2: Sections 2.4 – 2.8 [2]
UNIT-III	Chapter 2: Sections 2.12–2.14[2]
UNIT- IV	Chapter 10: Sections 10.1 to 10.4 and 10.7.1[2]
	Chapter 11: Sections 11.1 to 11.2(11.2.1 and 11.2.2 only)[2]
UNIT- V	Chapter 15: Sections 15.6(15.6.2 only) [2]
	Chapter 16: Sections 16.3(16.3.1 to 16.3.2) and 16.6(16.6.1 only)[2]

Reference Books

1. Gupta. S.C. &Kapoor. V.K.(2004). *Elements of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.
2. Veerarajan.T.(2010). *Probability, Statistics and Random Processes.* Tata Mc Graw Education Private.
3. Bhisma Rao.G.S.S. (2011). *Probability and Statistics*. Scitech Publications(India) Private Limited.

Web References:

1. **https://www.youtube.com/watch?v=6DYtC7lrVuY**
2. **https://www.youtube.com/watch?v=YGObRCEZiC8**
3. **https://www.youtube.com/watch?v=xZ_z8KWkhXE**
4. **https://www.youtube.com/watch?v=nk2COITm_eo**
5. **https://www.youtube.com/watch?v=2QeDRsxSF9M**
6. https://rcub.ac.in/econtent/ug/bcom/sem4/Business%20Statistics%20Unit%204%20Correlation%20and%20Regression.pdf

Pedagogy

Power Point Presentation, Group Discussion, Seminar, Assignment.

Course Designer

1. Dr. S. Saridha

Semester II	Internal Marks:25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	HRS. / WEEK	CREDITS
22UCS2AC3/ 22UCG2AC3/ 22UCA2AC3/ 22UIT2AC3	OPERATIONS RESEARCH	ALLIED	4	3

Course Objective

- **Understand** the various features of Operations research.
- **Analyze** the optimum solutions using Operations research.
- **Explore** the concepts of Operations research in real life problems.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the various techniques of Operations research.	K1
CO2	Illustrate the various notions in the respective streams.	K2
CO3	Identify the different terminologies of Operations research	K3
CO4	Analyze the solutions of mathematical problem using specific techniques.	K4
CO5	Simplify the optimum solutions of a mathematical problem.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO 5
CO1	3	2	3	3	2	3	3	3	2	3
CO2	3	2	3	3	2	3	3	3	3	2
CO3	3	2	3	3	2	3	2	3	2	2
CO4	3	2	2	2	2	3	3	2	3	2
CO5	3	2	3	2	2	3	3	3	2	2

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Operations Research** Introduction-Origin and Development of O.R.- Nature and Features of O.R.- Scientific Method in O.R.-Modelling in Operations Research - Advantage and Limitation of Models-General Solution Methods for O.R. Models- Methodology of Operations Research- Operations Research and Decision Making **Linear Programming Problem- Mathematical Formulation** Introduction-Linear programming Problem Mathematical Formulation of the problem -Illustrations on Mathematical Formulation of LPPs.(simple problems only) **Linear programming problem-Graphical Solution and Extension** Introduction- Graphical Solution Method- Genera Linear Programming Problem- Canonical and Standard Forms of LPP.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Linear Programming Problem-Simplex Method** Introduction-Fundamental Properties of Solutions-The computational Procedure- The Simplex Algorithm-Use of Artificial Variables-Big Method (simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Transportation problem** Introduction-LP Formulation of the Transportation Problem- Existence of Solution in T.P-The Transportation Table-Loops in Transportation Table-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality- Economic interpretation of u_j's and v_j's - Degeneracy in Transportation Problem-Transportation Algorithm (MODI method), (simple problems only). **Assignment Problem** Introduction-Mathematical Formulation of the Problem- Solution Methods of Assignment Problem-Special Cases in Assignment Problems (simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Sequencing problem** Introduction-Problem of Sequencing-Basic Terms Used in Sequencing- Processing n Jobs through Two Machines- Processing n Jobs through k Machines (problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Network Scheduling by PERT/CPM** Introduction- Network: Basic Components-Logical Sequencing- Rules of Network Construction-Concurrent Activities - Critical Path Analysis -	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

	Probability Considerations in PERT.			
VI	**Self-Study for Enrichment** **(Not included for End Semester Examination)** Application of Operations Research. – Two-Phase method – The Travelling Salesman problem – Processing 2 Jobs through *k* Machines – Inventory Models (without shortage)	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Kanti Swarup, P.K. Gupta, Manmohan (2019). *Operations research, Sultan Chand Publications.*

Chapters and Sections

UNIT–I Chapter 1: Sections 1:1 – 1:9
Chapter 2: Sections 2:1 – 2:4
Chapter 3: Sections 3:1 – 3:5

UNIT II Chapter 4: Sections 4:1 – 4:4

UNIT-III Chapter 10: Sections 10:1 – 10:3, 10:5, 10:6, 10:8 – 10:13
Chapter 11: Sections 11:1 – 11:4

UNIT-IV Chapter 12: Sections 12:1 – 12:5

UNIT-V Chapter 25: Sections 25:1 – 25:7

Reference Books

1. Hamdy A.Taha (2017),*Operations Research An Introduction,* Pearson India Education services PVTLtd.
2. Premkumar Gupta, Hira D.S.(2004), *Operations Research,* S.Chand & Company Ltd, New Delhi.
3. Chandrasekhara Rao.K,Shanti Lata Mishra(2008), *Operations Research,* Narosa Publishing HousePVT Ltd, New Delhi.

Web References

1. https://www.britannica.com/topic/operations-research
2. https://byjus.com/maths/linear-programming/
3. https://www.gatexplore.com/transportation-problem-study-notes/
4. https://youtu.be/rowWM-MijXU 5.https://youtu.be/TQvxWaQnrqI
6. https://youtu.be/RTX-ik_8i-k
7. https://youtu.be/s5KZw1EpBEo

Pedagogy

Power point presentation, Group discussion, Seminar, Assignment.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

SEMESTER III

Semester III	Internal Marks: 25			External Marks:75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
23UCG3CC5	**COMPUTER NETWORKS**	**CORE**	**5**	**4**

Course Objective

- To describe how computer networks are organized with the concept of layered approach
- To inculcate the knowledge in bandwidth utilization, IP addressing and Network Devices
- To understand the CISCO products and routing algorithms

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Define the fundamental concepts of Computer Networks	K1
CO2	Summarize the Process of Data communication between the nodes	K2
CO3	Explain the performance of Devices, Models, Addressing and Routing	K2
CO4	Make use of the various techniques of Networks	K3
CO5	Analyze and Determine the functionalities of different Components of Networks	K4, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2	3	3	3	2	3
CO2	2	2	2	2	2	2	2	3	2	2
CO3	2	2	3	1	2	2	2	2	2	3
CO4	2	2	2	2	3	2	3	2	2	3
CO5	3	3	3	3	3	2	3	3	2	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
" - " indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Need of Network** Network classifications LAN, MAN, WAN, Data and signals: Periodic Analog signals, Digital signals, bit rate, baud rate, bandwidth, Transmission impairments - Attenuation, Distortion and Noise, Data Communication protocols & standards, Network models - OSI model layers and their functions, TCP/IP protocol suite.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Bandwidth Utilization and Multiplexing** Multiplexing - FDM, TDM, Spread spectrum - Frequency hopping spread spectrum, Direct sequence spread spectrum, Transmission media - Guided and unguided media, Switching message, Circuit and Packet switched networks, Datagram networks and Virtual circuit networks.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**IP Addressing** IP Addressing Version 4 – IP Addressing Version 6- Subnetting Basic Version 4 - Subnetting VLSM – VLAN: VTP - CDP.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Routing Algorithms** Routing algorithms – Congestion Control Algorithms, CISCO PRODUCTS: CISCO Hardware - Cisco Software - Managing Password. Routing: Dynamic Routing protocols:- OSPF – RIP – EIGRP.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Monitoring Network Devices** Overview of ACL-NAT- WAN-Wireless LAN: IEEE 802.11- Architecture-MAC sublayer- Addressing Mechanism.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** (**Not to be included for End Semester Examination**) Error Detection and Correction - Domain Name Systems- Remote Logging TELNET - Electronic Mail - File Transfer.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. B A Forouzan. (2010). *Data Communications and Networking*. (4th Edition). M C Graw Hill Publications. **(Units: I, II, III)**
2. David J.Wetherall, Andrew S.Tanenbaum. (2019). *Computer Networks*, (5th Edition). Pearson Education. **(Units: I, IV)**
3. Silviu Angelescu (2010). *CCNA Certification All-in-One for Dummies*, Wiley Publications. **(Units: III, IV, V)**

Web References

1. https://www.studytonight.com/computer-networks/overview-of-computer-networks
2. https://www.tutorialspoint.com/data_communication_computer_network/index.html
3. https://www.geeksforgeeks.org/transport-layer-responsibilities/?ref=lbp

Pedagogy

Chalk & Talk, PowerPoint Presentation, Demonstration, e-Content

Course Designer

TCS

Semester III	Internal Marks:40			External Marks:60
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
23UCG3CC3P	**COMPUTER NETWORKS (P)**	**CORE**	**2**	**2**

Course Objective

- To understand the working principle of CISCO Packet Tracer
- To inculcate knowledge in configuration of switching
- To know the concepts of static and dynamic routing

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate the installation of CISCO Packet Tracer	K2
CO2	Make use of Switch Interface	K3
CO3	Experiment with VLAN	K3
CO4	Implement and examine the router setup and static routing	K3
CO5	Execute dynamic routing in CISCO Packet Tracer	K3

Mapping of CO with PSO and PO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	2	2	3	3	2	2	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no correlation.

List of Exercises

1. Installation of Cisco Packet Tracer
2. Configuration of Cisco Packet Tracer
3. Basic Switch Setup
4. Configuring Switch Interfaces
5. VLAN and VTP Configuration
6. Basic Router Setup
7. Configuration of Static Routes
8. Configuration of IP Routing using RIP

Software Essentials:

Cisco Packet Tracer software (Freeware)

Web References

1. https://booksite.elsevier.com/9780123850591/Lab_Manual/Lab_04.pdf
2. https://www.networkcomputing.com/data-centers/comparing-dynamic-routing-protocols
3. https://skillsforall.com/course/getting-started-cisco-packet-tracer
4. http://freeciscolab.com/category/lab-scenarios/
5. http://freeccnalab.com/
6. https://virl.scsiraidguru.com/?page_id=858
7. https://www.packettracernetwork.com/labs/lab1-basicswitchsetup.html

Pedagogy

Power Point Presentation, Demonstration

Course Designer

TCS

Semester III	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
23UCG3CC6	**INFRASTRUCTURE MANAGEMENT**	**CORE**	**5**	**4**

Course Objective

- To describe devices, drivers, configuration task
- To acquire the process of planning and configuring technique
- To monitor and create reports

Course Outcome with Cognitive Level

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

CO Number	CO Statement	Cognitive Level
CO1	Define the key concepts of Infrastructure Management	K1
CO2	Outline the functions of Configuration manager	K2
CO3	Utilize the knowledge to deploy client and server	K3
CO4	Analyze the performance of OS and able to monitor the infrastructure	K4
CO5	Categorize and explain the functions of SCCM and SCOM	K4, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2	2	2	2	3	2
CO2	3	2	2	3	2	2	3	2	3	2
CO3	3	2	3	3	3	3	3	2	3	2
CO4	2	3	2	3	2	2	3	2	3	3
CO5	3	2	2	3	3	3	3	2	3	2

"1"-Slight (Low)Correlation
"2"-Moderate(Medium)Correlation
"3" –Substantial (High)Correlation
"-" - Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Windows 10 Client OS** Introducing Windows 10, Overview of Deploying Windows 10, Configure Devices and Drivers, Perform Post installation Configuration Tasks, Managing Apps in Windows.	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Introduction to SCCM** System Center Configuration Manager Overview, SCCM Features and Capabilities, SCCM Setup & Installation, Configuration Manager Basics, Deploying SCCM Client, User and Device Collections in SCCM.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Managing Systems with SCCM** Application Management using SCCM, Operating System Deployment using SCCM, Endpoint Protection using SCCM, Creating Reports using SCCM Reports.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Introduction to SCOM** System Center Operations Manager Overview, SCOM Features and Capabilities, SCOM Setup & Installation, Operations Manager Basics, Deploying SCOM Clients, Management Packs in SCOM.	17	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Monitoring Systems with SCOM** Managing & Administering SCOM Environment, Managing Alerts using SCOM, Creating Custom Management Packs and Alerts, Troubleshooting SCOM Server, Troubleshooting SCOM Clients, Creating Reports using SCOM Reporting.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not to be included for End Semester Examination)** 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.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Suggested Readings

1. Woody Leonhard, Ciprian Rusen. (2021). *Windows 10 All-in-One For Dummies*
2. Kerrie Meyler, Gerry Hampson, Saud Al-Mishari, Greg Ramsey, Kenneth van Surksum, Michael Gottlieb Wiles. (2018).
   System Center Configuration Manager Current Branch Unleashed. (1st Edition). Sams Publishing.
3. Kevin Greene. (2016). *Getting Started with Microsoft System Center Operations Manager*

Web References

- **Windows 10**
  - Windows 10 Tutorial - 3.5 Hour Windows Guide + Windows 10 Tips
  - Windows 10 for Dummies, Newbies, and other Fine Beginners
- **System Center Configuration Manager (SCCM)**
  - System Center Configuration Manager Overview
  - SCCM Features and Capabilities
  - SCCM Setup & Installation
  - Configuration Manager Basics
  - Deploying SCCM Client
    - Configuration Manager client application
    - Client installation methods in Configuration Manager
  - User and Device Collections in SCCM
    - Introduction to collections in Configuration Manager
    - Prerequisites for collections in Configuration Manager
    - How to create collections in Configuration Manager
    - How to manage collections in Configuration Manager
  - Application Management using SCCM
    - Create applications in Configuration Manager
    - Deploy applications with Configuration Manager
    - Manage Applications
    - Monitor applications from the Configuration Manager console
  - Operating System Deployment using SCCM
    - Introduction to operating system deployment in Configuration Manager
    - Infrastructure requirements for OS deployment in Configuration Manager
    - Scenarios to deploy enterprise operating systems with Configuration Manager
  - Endpoint Protection using SCCM
    - Endpoint Protection Overview
    - Endpoint Protection Client
    - Example Scenario: Use Endpoint Protection to protect computers from malware
  - Troubleshooting SCCM Server
  - Troubleshooting SCCM Clients
  - Creating Reports using SCCM Reports
    - Operations and maintenance for reporting in Configuration Manager
    - List of reports in Configuration Manager
- **System Center Operations Manager (SCOM)**
  - System Center Operations Manager Overview
    - Operations Manager key concepts
  - SCOM Features and Capabilities
  - SCOM Setup & Installation
    - Deploying System Center Operations Manager
    - Single-server deployment of Operations Manager
  - Operations Manager Basics
    - Management server
    - Web console server
    - Reporting server
    - Operational database
    - Data warehouse database

- Deploying SCOM Clients
  - Install Agent on Windows Using the Discovery Wizard
- Management Packs in SCOM
  - What is in an Operations Manager management pack?
  - Management packs installed with Operations Manager
- Managing & Administering SCOM Environment
  - How to connect to the Operations and Web Console
  - Finding data and objects in the Operations Manager consoles
  - Using the Operations Manager Operations console
  - Using the Administration workspace in Operations Manager
- Managing Alerts using SCOM
  - How an alert is produced?
  - Viewing active alerts and details
  - How to suspend monitoring temporarily by using maintenance mode
- Creating Custom Management Packs and Alerts
  - Management pack templates
  - Create management pack templates
- Troubleshooting SCOM Server
- Troubleshooting SCOM Clients
- Creating Reports using SCOM Reporting
  - Using the Reporting Workspace in Operations Manager
  - How to create reports in Operations Manager
  - How to run, save, and export a report

Pedagogy

Chalk and talk, Power point Presentation, Demonstration, e-content

Course Designer

TCS

Semester- III	Internal Marks: 25			External Marks: 75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS/WEEK**	**CREDITS**
22UCG3AC4	**DIGITAL COMPUTER FUNDAMENTALS**	**SECOND ALLIED COURSE-I (AC)**	**4**	**3**

Course Objectives

- To acquire the knowledge and understanding of Digital Electronics concepts.
- To impart how to design Digital Circuits.
- To acquire the knowledge of Memory Devices
- To Understand the working mechanism and design guidelines of different. combinational, sequential circuits and their role in the digital system design.
- To acquire Knowledge of the positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.

Pre-Requisites

- Basic knowledge on number system.
- Basics mathematical knowledge on conversion of number system.
- A basic understanding of digital circuits.
- Fundamental ideas on Memory devices.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the Course, the Student will be able to,	Cognitive Level
CO 1	Outline the knowledge of Binary conversion, Code system, Logic gates and their circuits, Memory storage.	K1,K2
CO 2	Illustrate the concepts of Digital Principles, Logical Circuit and Memory System	K1,K2
CO 3	Extend the concept of Binary Addition, Subtraction, Multiplication, Division, Boolean Algebra and Logic Gates, Memory Storage.	K1,K2
CO 4	Apply the Concepts of number conversion , Combinational Logic circuits and Sequential Logic Circuits, Memory storage:	K2,K3
CO5	Utilize the Digital concepts of Binary numbers and Binary Codes, Logical Circuits and memory storage	K2, K3

Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	2	3	3	3	2	3	3
CO 2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	2	3	3
CO 4	3	3	3	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" – indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**NUMBER SYSTEMS AND CODES** Introduction to Number Systems and Conversion – Binary to Decimal Conversion – Decimal to Binary Conversion – Binary Addition and Subtraction – Binary Multiplication and Division– Representation of Negative Numbers - 1's complement and 2's complement - Complement arithmetic-BCD code, Digital Codes -Excess-3 code, Gray code, Binary to Excess -3 code conversion and vice versa**.**	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**BOOLEAN ALGEBRA AND LOGIC GATES** Boolean Algebra: Definitions –Rules and Laws of Boolean Algebra – Boolean Functions – Minterms and Maxterms – Simplification of Boolean expressions – Demerger's Theorems. Logic Gates: Basic Gates and – Applications of XOR Gate – Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**COMBINATIONAL LOGIC CIRCUITS** Design Procedure - Half and Full Adders – BCD Adder - Binary Subtractors – Half and Full Subtractors – Multiplexers (4:1 line) – 1 to 4 line Demultiplexers – Decoders: BCD to decimal - BCD to Seven Segment - Encoders: 4:2 line, Octal to Binary.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**SEQUENTIAL LOGIC CIRCUITS** Flip Flops – RS Flip Flop – Clocked RS Flip Flop – D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop – Counters – synchronous Counter – Asynchronous/Ripple Counter – Ring Counter.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**MEMORY AND STORAGE** Classification of memories – ROM – ROM organization – PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell .	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**SELF STUDY FOR ENRICHMENT (Not to be included for External Examination)** BCD code – Subtraction by l's and 2's complement method – Solving Boolean Expressions using Karnaugh Map (3 and 4 variables) – Complement, Shifting programming.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Vijayendran. V, (2003). *Digital fundamentals*. (1st edition) S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. Jain R P, (2009). *Modern Digital Electronics*. (4th Edition) Tata Mc Graw Hill, New Delhi.

Reference Books

1. Anand Kumar A, (2016). *Fundamentals of Digital Electronics*. (1st edition) PHI Learning Pvt. Ltd., New Delhi.
2. Godse.D.A, Godse.A.P, (2008). *Digital Electronics.* (1st edition) Technical publications, Maharashtra.

Web References

1. https://www.educba.com/digital-computer-fundamentals/
2. https://collegedunia.com/exams/number-system-mathematics-articleid-3097
3. https://www.tutorialspoint.com/difference-between-half-adder-and-full-adder
4. https://electronicsdesk.com/8085-microprocessor.html
5. https://www.digimat.in/nptel/courses/video/108105102/L01.html

Pedagogy

Chalk and Talk, Seminars, Power Point Presentation, Quiz, Assignment and Group discussion.

Course Designer

Dr.B.Anitha

Dr.T.Noorunnisha

Semester III	Internal Marks: 40		External Marks: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
22UCG3GEC1P	**OFFICE AUTOMATION (P)**	**GEC**	**2**	**2**

Course Objective

- To have a hands on experience in Microsoft Office package
- To familiarize the students in preparation of documents and presentations with office automation tools
- To inculcate the knowledge of Macros

Course Outcomes with Cognitive Level

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

CO Number	CO Statement	Cognitive Level
CO1	Describe the concepts of Office Package.	K1
CO2	Recognize when to use each of the Office programs to create professional and academic documents.	K2
CO3	Use Office programs to create personal, academic and business documents following current professional and/or industry standards.	K3
CO4	Test the working knowledge of advanced concepts of Office Software.	K4
CO5	Assess oneself to get employment with this practical hands on training.	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3

"1"-Slight (Low) Correlation "2" - Moderate (Medium) Correlation

"3" –Substantial (High) Correlation "-'' - Indicates there is no Correlation

List of Exercises

1. Open a new office document and perform the following operations in it
    i. Text Alignment
    ii. Change line spacing to 1.5
    iii. Place a box to the entire text
    iv. Add the bullets and numbering
    v. Change type of font types and sizes
    vi. Insert the symbols

2. Prepare an advertisement to a company with the following specifications
    i. Attractive Page Border
    ii. Design the name of company using WordArt
    iii. Use ClipArt
3. Design a Visiting Card for a company with the following specifications
    i. Size of the Visiting Card is 4" X 3"
    ii. Name of the company with a WordArt
4. Perform Table Creation, Formatting and Conversion
5. Perform mail merge and letter preparation.
6. Working with Macros
7. Perform the formula editor.
8. Perform the insertion of objects, graphics and protecting the document.
9. Draw a line, XY, bar and pie chart for a given user data.
10. Perform the sorting and import/export features.
11. Create a Presentation using wizard.
12. Create a presentation on Tourism of a place using different template, color schema and text Formats.
13. Create a presentation about your college and department using animations and sound effects. Add OLE object to your presentation.

Web References

1. https://www.tutorials.com/
2. https://www.computer-pdf.com/

Pedagogy

Power point Presentation, Demonstration

Course Designer

Ms.V.Kavitha

SEMESTER IV

Semester IV	Internal Marks: 50			External Marks:50
COURSE CODE	COURSE TITLE	CATEGORY	HRS. / WEEK	CREDITS
			T / P	
23UCG4CC7	DATABASE MANAGEMENT SYSTEMS (T& P)	CORE	4 / 2	5

Course Objective

- To study the basic concepts of database systems and its Architecture
- To understand Database design and E-R model
- To inculcate knowledge of Relational database management

Course Outcome and Cognitive Level Mapping

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

COS	CO STATEMENT	COGNITIVE LEVEL
CO1	Remember and understand the fundamental concepts of databases	K1, K2
CO2	Classify and make use of the database models	K2, K3
CO3	Utilize and Examine database functionality	K3, K4
CO4	Analyze and Select the queries for data retrieval from the database	K4, K5
CO5	Evaluate a database for real-time applications	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2	3	2	2	3	2
CO2	3	3	2	2	2	3	2	3	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1"-Slight (Low) Correlation
"2"-Moderate (Medium) Correlation
"3" –Substantial (High) Correlation
"-" - Indicates there is no Correlation

Syllabus:

Theory:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Database and Database Users:** Introduction-Characteristics of the Database Approach-Actors on the Scene-Advantage of Using DBMS Approach- **Database System Concepts and Architecture:** Data Models, Schema and Instances-Three Schema Architecture and Data Independence –Database Language and Interfaces-The Database System Environment - Centralized and Client/Server Architecture for DBMSs-Classification of Database Management Systems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Relational Model:** Structure of Relational Databases -Database Schema - Keys - Schema Diagrams - Relational Query Languages – **Formal Relational Query Languages: The Relational Algebra:** Fundamental Operation-Additional Relational Algebra Operations	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**SQL**: Overview of the SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - Set Operations - Null Values Aggregate Functions - Nested Subqueries - Modification of the Database -Join Expressions - Views - Transactions - Integrity Constraints - SQL Data Types and Schemas – Authorization.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Formal Relational Query Languages :** The Tuple Relational Calculus - The Domain Relational Calculus- **Database Design and the E-R Model:** Overview of the Design Process - The Entity- Relationship Model –Constraints-Reduction to Relational Schemas - Entity-Relationship Design Issues - Extended E-R Features.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Basics of Functional Dependencies and Normalization for Relational Databases**: Functional Dependencies-Normal Forms Based on Primary Keys-General Definition of Second and Third Normal Forms-Boyce-Codd Normal Form- Multivalued Dependency and Fourth Normal Form- Join Dependencies and Fifth Normal Form.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment (Not to be included for End semester Examinations)** Database System Architecture: Centralized and Client Server Architecture-System Server Architectures- Parallel Systems-Distributed Systems	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. A Ramez Elmasri.Shamkant B Navathe (2019). *Fundamentals of Database Systems* 7th Edition. Pearson India Education Services Pvt. Ltd
2. Abraham Silberschatz, Henry F.Korth, S.Sudharsan.(2017*).Database System Concepts* 6th Edition. Mc Graw Hill Education Pvt. Ltd.

Reference Books

1. Alexis Leon &Mathews Leon.(2008).*Database Management Systems,* Vikas Publishing.
2. Raghu Ramakrishnan & Johannes Gehrke.(2003).*Database Management Systems* 3rd Edition, Tata McGraw Hill Education Pvt. Ltd

Web References

1. https://www.tutorialspoint.com/
2. https://www.sausriengg.com/e-course-material
3. https://www.ntu.edu.sg/home/ehchua/programming/sql/

Practical

List of Exercises

1. Write SQL queries to perform DDL & DML operations
2. Develop SQL queries to implement the Set operations
3. Develop SQL queries to implement the Aggregate functions
4. Develop SQL queries to implement Join operations
5. Develop SQL queries to implement Nested subqueries
6. Develop SQL queries to create a view and expand it
7. Develop SQL queries to implement String Operations
8. Create a database for a banking enterprise and generate suitable reports

Web References

1. https://www.w3resource.com/2.https://www.ntu.edu.sg/home/ehchua/programming/sql/
2. https://www.tutorialride.com/

Pedagogy

Quiz, Assignment, Chalk & Talk, Power Point Presentation and e-Contents

Course Designer

Ms.R.Rita Jenifer

Semester IV	Internal Marks: 25			External Marks: 75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS/WEEK**	**CREDITS**
22UCG4AC6	**MICROPROCESSOR & MICROCONTROLLERS**	**SECOND ALLIED COURSE-II (AC)**	**5**	**4**

Course Objectives

- To understand the architecture of 8085& 8051.
- To impart the knowledge about the instruction set.
- To develop skill in writing simple programs for 8085 and its interfacing applications.
- To acquire the knowledge and understanding of peripheral devices.

Pre-Requisites

- Basics mathematical knowledge on conversion of number system.
- A basic understanding of digital circuits.
- Fundamental ideas on Architecture and flow chart.
- Basic knowledge and understanding on programming.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the Course, the Students will be able to,	Cognitive Level
CO 1	Understand the architecture and programs of 8085 and 8051	K1, K2
CO 2	Illustrate the knowledge about the instruction sets of 8085 & 8051	K1, K2
CO 3	Distinguish between 8085 and 8051 architectures and various functions	K1, K2
CO 4	Outline the functions of 8085, 8051 and peripheral devices	K2, K3
CO5	Develop skill of writing program for 8085 and 8051 based systems	K2, K3

Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2	2	2	2	3	2	2	2	3	3
CO 2	2	2	3	2	3	2	2	3	3	3
CO 3	2	2	2	2	3	2	2	2	3	3
CO 4	2	2	2	2	3	2	2	3	3	3
CO 5	2	2	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" – indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**MICROPROCESSOR (8085)** Microprocessor evolution and types, Microprocessor architecture and operations of its components-data and address bus - pin configuration – flags - addressing modes, Interrupts, data transfer schemes, instruction and data flow - timing diagram - memory read and write – I/O read and write.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**MICROPROCESSOR INSTRUCTION SET** Instruction set: data transfer, arithmetic, logic, branch operations, stack, I/O operations, control looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**SIMPLE PROGRAMS** 8- bit Addition – 8-bit Subtraction – Multiplication and Division - Decimal to HEX and HEX to Decimal conversion - Finding the largest and smallest number between two numbers - Finding the largest and smallest number in a data array- sum of a series – Ascending and descending order – 1's complement and 2's complement.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**PERIPHERAL AND INTERFACING** Interfacing Devices and I/O Devices: Generation of control signals for memory and I/O devices. Peripheral Devices: 8237 DMA Controller - 8255 programmable peripheral interface - 8253/8254 programmable timer/counter - 8259 programmable interrupt controller - 8251 USART.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**MICROCONTROLLER (8051)** Comparison between microprocessor and microcontroller - Features of 8051 - Architecture - Pin configuration – 8051 interrupts - Memory organization - External data and program memory - Addressing modes.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**SELF STUDY FOR ENRICHMENT (Not to be included for External Examination)** BCD to Binary and Binary to BCD conversions –BCD to HEX and HEX to BCD conversions- BCD seven segment display- Subtraction using 1's complement and 2's complement.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Gaonkar,Ramesh S (1984). *Microprocessor Architecture, Programming and Applications with 8085.* (5th Edition) Pearson Education.
2. Ram . B , (2013). *Fundamental of Microprocessor and microcontroller.* (8th Edition) Dhanpat Rai Publications(P) Ltd, New Delhi.
3. Muhammad Ali Mazidi,Janice Gillispie Mazidi, Rolin D. McKinlay, (2005). *The 8051 Microcontroller and Embedded Systems.* (2nd Edition) Prentice Hall of India, New Delhi.

Reference Books

1. Nagoorkani A (2012). *Microprocessors & Microcontrollers.* (2nd Edition) RBA Publications, Chennai.
2. Godse.D.A, Godse.A.P, (2017) *Microprocessors and Microcontrollers,* (4th Revised Edition) Technical Publications,Pune.

Web References

1. https://www.tutorialspoint.com/microprocessor/microcontrollers_overview.htm
2. https://www.guru99.com/difference-between-microprocessor-and-microcontroller.html
3. https://www.javatpoint.com/microprocessor-tutorial
4. https://electronicsdesk.com/8085-microprocessor.html

Pedagogy

Chalk and Talk, Seminars, Power Point Presentation, Quiz, Assignment and Group discussion.

Course Designer

Dr.T.Noorunnisha

Semester IV	Internal Marks: 40		External Marks: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS/WEEK**	**CREDITS**
22UCG4AC5P	**DIGITAL & MICROPROCESSOR(P)**	**SECOND ALLIED COURSE-II (AP)**	**3**	**2**

Course Objectives

- To enable the student to gain practical knowledge.
- To acquire basic understanding of laboratory techniques.
- To enhance the experimental skills.
- To understand the theory and develop practical application skills.

Pre -requisites

- Basic knowledge on usage of logic gates.
- Fundamental ideas on microprocessor.
- Understanding on Digital circuit connection.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recall the principles of electronics.	K1
CO2	Interpret findings using the correct physical scientific framework.	K2
CO3	Analyze working principles of logic gates.	K4
CO4	Design electronic circuits.	K5
CO5	Design program using microprocessor.	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2	3	2	1	2	3
CO2	2	3	2	3	2	3	3	2	3	3
CO3	2	3	2	3	3	3	3	3	3	3
CO4	2	3	3	3	3	3	1	3	3	2
CO5	3	3	3	3	3	3	2	3	2	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" – indicates there is no correlation.

Syllabus

LIST OF EXPERIMENTS (Any 8)

Digital Electronics

1. Verification of Logic gates.
2. Construction of Half adder and Half Subtractor.
3. NAND as Universal Building Block.
4. Solving Boolean expression using k-Map.
5. Excess-3 to BCD Conversion using gates
6. Construction of RS Flip Flop

Microprocessor 8085

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and 8-bit division.
3. Conversion from decimal to hexadecimal.
4. Conversion from hexadecimal to decimal system.
5. Finding the largest number in a data array.
6. Find the sum of series.

Text Books

1. Ouseph, C.C., Rao, U.J., Vijayendran, V., (2016). *Practical Physics and Electronics*. S.Viswanathan,Printers & Publishers Pvt Ltd., Chennai.
2. Vijayendran.V, (2009). *Introduction to Integrated Electronics: Digital and Analog* (Revised Edition). Viswanathan S., Printers & Publishers Pvt Ltd., Chennai.
3. Ram.B, (2013). *Fundamental of Microprocessor and microcontrolle*r (8^{th} Edition). Dhanpat Rai Publications(P) Ltd., New Delhi.

Reference Books

1. Anand Kumar.A, (2016). Fundamentals of Digital Electronics. (4th Edition). PHI Learning Pvt. Ltd., New Delhi.

Web References

1. https://de-iitr.vlabs.ac.in/exp/truth-table-gates/simulation.html
2. https://de-iitr.vlabs.ac.in/exp/half-full-adder/simulation.html
3. http://vlabs.iitkgp.ernet.in/coa/exp13/index.html#
4. https://www.vlab.co.in/
5. https://de-iitr.vlabs.ac.in/exp/realization-of-logic-functions/theory.html

Pedagogy

Demonstration and practical sessions.

Course Designer

Dr.A.Mary Girija

Semester IV	Internal Marks: 40		External Marks:60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG4GEC2P	**MULTIMEDIA (P)**	**GEC**	**2**	**2**

Course Objective

- To learn and understand technical aspect of Multimedia Systems
- To give an overall view of multimedia tools
- Explore various photo editing features, animation techniques and demonstrate proficiency in developing the multimedia presentations

Course outcomes with Cognitive Level

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

CO Number	CO Statement	Cognitive Level
CO1	Identify the basic tools and components of a Multimedia	K1
CO2	Explain / Outline the concepts of Multimedia	K2
CO3	Create simple shapes using animation editing software and design simple animation by applying shape tweens and motion tweens	K3
CO4	Apply the basic elements and principles of photo editing software to achieve a great photo effect by applying effects like color, shadows, alteration of backgrounds, cropping and collage making	K4
CO5	Design and implement the various graphic and text information in Photoshop	K6

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	2	2	2	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1"-Slight (Low) Correlation
"2"- Moderate (Medium) Correlation
"3" –Substantial (High) Correlation
"-" - Indicates there is no Correlation

List of Exercises

1. Create an animation to represent the Growing Moon in Flash.
2. Create an animation for bouncing a ball in Flash.
3. Change a Circle into a Square in Flash.
4. Display the Background image given through your name using mask in Flash.
5. Create the animation using Flash with the following features:

   WELCOME

   - Letter should appear one by one.
   - The fill colour of the text should change to a different colour after the display of the full word.
6. Program to create an image and demonstrate basic image editing using Photoshop.
7. You are given a picture of a garden as background. Extract the image of a butterfly from another picture and organize it on the background.
8. Given a picture, make three copies of this picture. On one of these pictures, adjust the brightness and contrast, so that it gives an elegant look. On the second picture, change it to grayscale and the third is the original one.
9. Design a visiting card containing at least one graphic and text information in Photoshop.
10. Import two pictures, one that of sea and another of clouds. Morph, Merge and Overlap the images.

Web References

1. http://tutorials4computer.blogspot.com/2015/02/procedure-to-create-animation- to.html
2. http://dte.kar.nic.in/STDNTS/CS%20IS/multimedia%20lab%20programs.pdf
3. https://www.adorama.com/alc/how-to-edit-your-photos-5-photoshop-editing-steps- for-beginners

Pedagogy

Power Point Presentation, e-Content.

Course Designer

Ms. N.Agalya

Semester IV	Internal Marks: 100		External Marks: -	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
24UGCM	**CAMPUS TO CORPORATE**	**AECC**	**2**	**1**

Course Objective:

- To develop confidence and competence in corporate world and BPS industry.
- To enhance communication skills, analytical thinking and professional skills.
- To enrich knowledge of vocabulary, writing skills, presentation skills and managing time and stress.

Course Outcome with Cognitive Level

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

COs	CO Statement	Cognitive Level
CO1	Recall to relate BPS in Corporate society and in the world.	**K1**
CO2	Illustrate to understand the campus and corporate life in real life situations.	**K2**
CO3	Develop etiquette skills in workplace and to be groomed in Professional ethics and management for higher research.	**K3**
CO4	Apply Professional skills in career and build communication skills for a holistic approach.	**K3**
CO5	Examine LSRW Skills and create a campus corporate world for higher prospects and better learning to tackle problems in society.	**K4**

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO4
CO1	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**
CO2	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**
CO4	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
CO5	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**

"1"- Slight (Low) Correlation
"2"- Moderate (Medium) Correlation
"3" - Substantial (High) Correlation
"-" - Indicates there is no Correlation

Syllabus:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Overview of Corporate: Ice-breaker Session, What is Corporate? - History of Corporate. Overview of BPS Industry: What is BPS? – History of BPS - Benefits of BPS - BPS Industry in World - BPS Industry in India - TCS BPS.	**6**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
II	Change Management (Understand the difference between campus and corporate life and prepare themselves for the same). Learn the Culture - Impact of your attitude and behavior - Consider the language - Establish and maintain relationship - Respect others - Be Confident - Keep on learning &consider the body language**.**	**6**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
III	**Corporate Etiquettes:** Dressing and Grooming Skills - Workplace Etiquette - Business Etiquette - Email Etiquette -Telephone Etiquette - Meeting Etiquette & Presentation Skills. **Professional Competencies**: Analytical Thinking - Listening Skills - Time Management -Team Skills – Assertiveness - Stress Management - Participating in Group Discussion- Interview Facing - Ownership and Attention to detail.	**6**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
IV	**Grammar-** Phonetics- One on One basic conversation Skill Practice. Reading Comprehension- Listening Comprehension - Improving Vocabulary - Improving Writing Skills and Comprehension while interacting face to face.	**6**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
V	Recitation of short stories - Interview Skills - Group Discussion - Social Conversation Skills- Presentation & One Act Plays.	**6**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
VI	**Self-Study for Enrichment** **(Not to be included for End Semester Examinations)** Communication skills, Leadership Qualities, Panel Interview, Screening or Telephonic interview	**-**	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4

Suggested Readings

1. Alex,K.(2009).*Soft Skills.* New Delhi: S.Chand and Company Ltd.
2. Dr. Rita Shanthakumar and Dr.S.Jayashree Agarwal. *Handbook of Professional Skills*

Web References

1. https://www.careerizma.com/blog/how-to-behave-corporate-world/
2. https://www.business-standard.com/company/tcs-5400/information/company-history
3. https://www.britannica.com/science/phonetics

Pedagogy

Power Point Presentation, Discussion, Quiz

Course Designer

TCS

Assessment Rubrics for 100 Marks

1. **Mock Interview – 25 Marks**
2. **Panel Discussion – 25 Marks**
3. **Quiz – 25 Marks**
4. **Debate (or) Elocution- 25 Marks**

There will be no End Semester Examination for this course. However, the subject teacher will evaluate the above mentioned components based on the performance of the students and submit the marks out of 100 (in the format to be supplied by the COE) with the approval of the concerned Head of the Department to the COE along with CIA marks of other courses.

SEMESTER V

Semester V	Internal Mark: 50			External Mark: 50
COURSE CODE	COURSE TITLE	CATEGORY	HRS. / WEEK	CREDITS
			T / P	
23UCG5CC8	SOFTWARE TESTING (T & P)	CORE	3 / 2	4

Course Objective

- To understand the basic concepts of Selenium
- To inculcate complex practical skills in Scripting
- To implement the testing concepts using Selenium

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Recite the basic concepts of Selenium	K1
CO2	Identify and examine the test scripts to validate functionality using Selenium	K1, K2
CO3	Explain and demonstrate the software testing based on Selenium	K2, K3
CO4	Apply and analyze various problems using Selenium	K3, K4
CO4	Experiment and evaluate the automated test across browsers using Selenium testing tool	K4, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2	3	3	2	2	2
CO2	3	3	3	2	2	3	3	2	2	2
CO3	3	3	3	2	2	3	3	2	2	2
CO4	3	3	3	2	1	3	2	2	2	2
CO5	3	3	3	3	1	3	2	2	1	1

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no correlation.

Syllabus

Theory:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Selenium Basics** **Introduction of Selenium:** Selenium's tool suite – How to choose the right Selenium tool for your need- Installation requirements for Selenium. **Installing Selenium Components**: Installing Selenium IDE – Installing Firebug plug-in – Installing the Fire Path – Installing JDK – Installing and configuring Eclipse – Installing Win ANT.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Selenium IDE and UI Controls** **Using Selenium IDE:** Selenium IDE interface – Recording Using Selenium IDE – Save and replay the script using IDE – Inserting / Editing Test steps manually – Adding verifications and asserts with the context menu. **Managing User Interface (UI) Controls:** How does Selenium IDE replay scripts – Locate the elements on a web page – Find XPath using Firefox Add-on.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Create and Verification of WebDriver Script** **Creating First Selenium WebDriver script:** Recording and exporting script from IDE – Configure eclipse to work with Selenium – Running the test. **Selenium Methods:** Selenium WebDriver methods. **Verification Point in Selenium:** Need for a verification point – Inserting a verification point – Understand how to implement a few common validations – Assets statements in Junit.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Popup Dialogs, Debugging and Reporting** **Handling Pop-up dialogs and multiple windows:**	9	CO1, CO2,	K1, K2,

	Handle alerts and prompts – Working with multiple windows. **Debugging scripts:** Debugging features – Run Tests in Debug mode with Breakpoints – Step commands, variables and watch. **Reporting in Selenium:** Test Framework Reporting Tools – Configuring Junit HTML Reports – Configuring TestNG Report for your tests – Custom reporting in excel sheets or databases.		CO3, CO4, CO5	K3, K4, K5
V	**Automation Frameworks and Selenium Functions** **Automation Frameworks:** Why do we need automation frameworks – What exactly is an automation framework – Types of frameworks. **Selenium Functions:** How to use JavaScript – How to read rows, columns and cell data from table – working with multiple browsers – working with drop-down lists – working with radio buttons and groups – working with checkboxes.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self study for Enrichment (Not to be included for End Semester Examinations)** **Exception Handling in WebDriver:** Handling WebDriver Exceptions, handle Specific Exceptions – Common WebDriver Exceptions.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Navneesh Garg. (2014). *Test Automation using Selenium WebDriver with Java: step by step Guide.* AdactIn Group Pty Ltd.

Reference Book

1. Rex Allen Jones – II. (2016). *Absolute beginner Java 4 selenium WebDriver: Come learn how to program automation testing.* Rex Jones II, CSTE, TMap.

Web References

1. https://www.tutorialspoint.com/selenium/selenium_ide.htm
2. https://www.guru99.com/locate-by-link-text-partial-link-text.html
3. https://www.geeksforgeeks.org/selenium-basics-components-features-uses-and-limitations/
4. https://www.javatpoint.com/selenium-tutorial

Practical:
List of Exercises:

1. Write a script to open google.com and verify that title is Google and verify that it is redirected to google.co.in.
2. Write a script to open google.co.in using chrome browser (Chrome Driver).
3. Write a script to open google.co.in using internet explorer (Internet Explorer Driver).
4. Write a script to create browser instance based on browser name.
5. Write a script to search for specified option in the list box.
6. Write a script to print the content of list in sorted order.
7. Write a script to print all the options. For duplicates add entry only once. Use HashSet.
8. Write a script to close all the browsers without using quit() method.
9. Write generic method in selenium to handle all locators and return web element for any locator.
10. Write generic method in selenium to handle all locators containing dynamic wait and return web element for any locator.

Pedagogy

Chalk and talk, Power Point Presentation, Assignment, Demonstration, Quiz and Seminar.

Course Designer

TCS

Semester V	Internal Marks:50			External Marks: 50
COURSE CODE	COURSE TITLE	CATEGORY	HRS./ WEEK	CREDITS
			T / P	
23UCG5CC9	INTRODUCTION TO DIGITAL TECHNOLOGIES (T & P)	CORE	4 / 2	5

Course Objective

- To study the basic concepts of Digital Technologies
- To understand about Robotic Process Automation tools
- To develop bots through Automation Anywhere

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Remember and understand the key concepts of digital technologies	K1,K2
CO2	Classify and make use of current technologies	K2
CO3	Implement information in new situations	K3
CO4	Analyze the different use cases	K4
CO5	Evaluate new ideas	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2	3	2	2	3	2
CO2	3	3	2	2	2	3	2	3	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1"-Slight (Low) Correlation
"2"-Moderate (Medium) Correlation
"3" –Substantial (High) Correlation
"-" - Indicates there is no Correlation

Syllabus

Theory:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Digital Primer:** Why is Digital Different, Digital Metaphors, On Cloud 9, A Small Intro to Big Data, social media & Digital Marketing, Artificial Intelligence, Unchain the Blockchain, Internet of Everything, Immersive Technology	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Digital for Industries:** Manufacturing and Hi-tech,Banking and Financial Services, Insurance and Healthcare. Retail. Travel & Hospitality, Communications, Media & Information Services and Government.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Automatix – Art of RPA:** Introduction - Setting the Context, RPA Prelude, RPA Demystified, RPA vs BPM, RPA Implementations.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**RPA:** RPA in Industries, RPA Tools, Automatix. **Automation Anywhere:** Getting Started with AA Enterprise, Exploring AA Enterprise, AA Enterprise – Architecture.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Automation Anywhere:** Knowing the Bots, More About Task Bots. AA Enterprise - Assess your Learning, All About Recorders, Designers, Meta Bots and Cognitive RPA.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment (Not to Be included for End Semester Examinations)** Inspiring Digital Transformation Case Studies: Amazon Business - Netflix - Tesla - Glass door- Walmart.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Vaibhav Srivastava (2021). *Getting started with RPA using Automation Anywhere: Automate your day-to-day Business Processes using Automation Anywhere*. 1st Edition, BPB Publications.
2. Arun Kumar Asokan and Nandan Mullakara (2020). *Robotic Process Automation Projects: Build Real-world RPA Solutions Using UiPath and Automation Anywhere*. 1st Edition, Packt Publishing Limited.

Reference Books

1. Adeel Javed, AnumSundrani (2021). Nadia Malik & Sidney Madison Prescott, *Robotic Process Automation using UiPath Studio X: A Citizen Developer's Guide to Hyper automation.* 1st edition, A press.
2. Jonathan Sireci (2021). *The Project Manager's Guide to RPA: A Practical Guide for Deploying Robotics Process Automation.* Independently Published.

Web References

1. https://university.automationanywhere.com/training/rpa-learning-trails/getting-started-with-rpa/
2. https://university.automationanywhere.com/training/rpa-learning-trails/citizen-developer-basics/
3. https://university.automationanywhere.com/training/rpa-learning-trails/tips-and-tricks-beginner/
4. https://www.youtube.com/watch?v=G0gVfi7ri7w
5. https://www.automationanywhere.com/products/enterprise/community-edition
6. https://whatfix.com/blog/digital-transformation-examples/

Practicals:

List of Exercises

1. Simple bot creation
2. Build a bot to automate the action of getting the title of an active window and to automate the action of closing a notepad window.
3. Build a bot to automate the task of replacing a few characters from a string.
4. Build a bot to automate the task of copying the files from a source folder to the destination folder.
5. Build a bot to automate the task of extracting a table from a webpage.
6. Build a bot to automate the task of extracting a text from a window and displaying the output.
7. Build a bot to automate the task of writing text into a notepad file.
8. Build a bot to automate the task of extracting the data from an Excel File according to some condition and storing the extracted data in another File.

Web References

1. https://www.edureka.co/blog/automation-anywhere-examples
2. https://docs.automationanywhere.com/bundle/enterprise-v2019/page/enterprise-cloud/topics/aae-client/bot-creator/commands/enter-data-into-webform-from-file.html

Resources

Lab Requirement: Automation Anywhere

Pedagogy

Chalk & Talk, PowerPoint Presentation, Demonstration, e-Content

Course Designer

TCS

Semester V	Internal Marks: 50			External Marks: 50
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. / WEEK**	**CREDITS**
23UCG5CC10	**CLIENT RELATIONSHIP MANAGEMENT (T & P)**	**CORE**	**T: 4, P: 2**	**5**

Course Objective

- To Acquire knowledge about ServiceNow platform
- To get acquainted with various features of ServiceNow platform and tool
- To use various script types used throughout the platform

Course Outcome and Cognitive Level Mapping

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

COs	CO Statement	Knowledge Level
CO1	Understand ServiceNow Intermediate Level	K1
CO2	Summarize the features of ServiceNow	K2
CO3	Make use of the database for process automation	K3
CO4	Analyze comprehensive knowledge in ServiceNow Interface	K4
CO5	Compare the script types throughout the platform	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**2**	**1**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**1**	**3**	**2**	**2**	**1**	**1**

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no correlation.

Syllabus

Theory

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**The Interface** - Versions, Frames, Important application menus and modules, Content Frame, UI Settings and Personalization. **Lists and Forms** – List V2 versus List V3, Lists and Tables, Forms.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**UI Customization** – Branding your Instance, Custom Themes, UI-Impacting System Properties, Configuring Service Portal UI, Creating a Custom Homepage, Styling Pages and Widgets, Setting up the War Room page, and Styling the CMS.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Understanding Data and Relationships** – One-to-many relationships in ServiceNow, Many-to-many relationships in ServiceNow, Enforcing one-to-one relationships, Defining Custom Relationships, Database table inheritance.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Tasks and Workflows** – Important Task fields, Journals, and the activity formatter, Extending the task table, Workflows, SLAs, Approvals, Assignment, Creating Task fields. **UI and Data Policies** – UI Policies, Reverse if false, Scripting in UI policies, UI Policy Order, Data Policies, Converting between data and UI Policies, Data Policies Vs ACLs.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**User Administration and Security** – Users, Groups and Roles, Emails and Notifications, User Preferences, ACLs – Security Rules. **Introduction to Scripting** – Client-side versus Server-side APIs, where scripting is supported, Integrated development environment.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	**Self study for Enrichment** **(Not to be included for End Semester Examinations)** CRM Ticketing System- Ticket Management Tool.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Tim Woodruff (2018). *Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation*. 2nd Edition, Packt Publishing Ltd.

Web References

1. https://www.tutorialspoint.com/
2. https://www.sausriengg.com/e-course-material
3. https://www.ntu.edu.sg/home/ehchua/programming/sql/

Practical

List of Exercises

1. Basic Navigation
    a. Navigation and the User Interface
    b. Navigating Applications
    c. Introduction to Searching
2. Managing Records in Lists
    a. Using Lists
    b. Finding Information in Lists
    c. Using Filters and Breadcrumbs
    d. Editing Lists
    e. Creating Personal Lists
3. Managing Records in Forms
    a. Forms

Resources

ServiceNow

Web References

- ServiceNow Essentials
- ServiceNow User Interface
- ServiceNow Fundamentals Simulator
- ServiceNow System Administrator Training

Pedagogy

Chalk and talk, Power Point Presentation, Assignment, Demonstration, Quiz and Seminar.

Course Designer

TCS

Semester V	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG5CC11	**VIRTUALIZATION & CLOUD**	**CORE**	**4**	**4**

Course Objective

- To understand the advent of distributed computing
- To become familiar with the concept of data centers
- To explore the working process of virtualization

Course Outcomes and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	Define the recent trends in computing and list the basics of Cloud Computing	K1
CO2	Interpret about Data centers and its transformations	K2
CO3	Apply the concept of Virtualization and identify the technologies of Virtualization.	K3
CO4	Examine and discover the concept of Cloud Computing	K4
CO5	Assess and perceive the knowledge of Hybrid Cloud	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**

"1"–Slight (Low) Correlation
"2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation
"-"indicates there is no correlation

Syllabus

Theory:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Distributed Systems**: Overview of Computing Paradigm, Recent trends in Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of Cloud Computing, Benefits of Cloud Computing	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Data Center:** Data Center Overview, Data Center Evolution, Modern Business Requirements for Data Center, Making Agile Datacenter, Data Center Transformations, Future of Data Centers	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Virtualization:** Virtualization, Need of Define Virtualization, Virtualization Technologies, Uses of Virtualization, Planning for Virtualization, Virtualization Pitfalls	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Cloud:** Cloud Fundamentals, Benefits of Cloud Computing, Type of Clouds, Cloud Computing Services, Cloud Computing Architecture, Virtualization and Cloud Computing, Grid Computing vs Cloud Computing, Security Concerns	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Hybrid Cloud:** Hybrid Cloud Fundamentals, Benefits of a Hybrid Cloud, Key Considerations for Hybrid Cloud, Components of Hybrid Cloud, Managing Hybrid Cloud Environments	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** Devise a model for Grid Computing, Hybrid Cloud Deployment Models	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. George, C., Jean, D., Tim, K., & Gordon, B. (2012). *Distributed Systems Concepts and Design.* 5th Edition.
2. Josyula, V., Orr, M., & Page, G. (2012). *Cloud Computing: Automating the Virtualized Data Center.* Cisco Systems.
3. Franklin, C., & Chee, B. J. (2019). *Securing the Cloud: Security Strategies for the Ubiquitous Data Center*. Auerbach Publications.

Web References

1. https://www.tutorialspoint.com/Distributed-Systems
2. https://blog.stackpath.com/distributed-system/
3. https://www.youtube.com/playlist?list=PLJuCep43JwAVl17HMP-ZRwmlEn2mzhha
4. https://www.youtube.com/playlist?list=PLndqfxA_9SWFsFpP1Db_E8DmzY3K5Wkq
5. https://www.guru99.com/cloud-computing-for-beginners.html
6. https://www.youtube.com/playlist?list=PLDns5jVqEmIoNrmSY0aRHwK5LqGM9u3LL
7. https://www.youtube.com/playlist?list=PLOspHqNVtKABPTyvxoNW0e4XSgCNdZ40F

Pedagogy

Chalk and Talk, PowerPoint Presentation, e-Content

Course Designer

TCS

Semester: V	Internal Marks: 25			External Marks: 75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
22UCG5DSE1A	**COMPUTER ORGANIZATION & ARCHITECTURE**	**DSE**	**5**	**4**

Course Objective

- To discuss the principles of computer organization and the basic architectural concepts.
- To understand the design of the various functional units and components of computers.
- To exemplify in a better way the memory organization, address decoding, basic I/O interfaces and port addressing

Course Outcome and Cognitive Level Mapping

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	Recall and summarize the basic concept of computer fundamentals	K1, K2
CO2	Identify and interpret digital representation of data in a computer system	K2, K3
CO3	Discuss and discover the internal structure of the processor and the use of microprogramming.	K3, K4
CO4	Apply and explain the concept of stored program, components of the computers with each other	K3, K5
CO5	Examine and evaluate problems, understand the performance requirements of systems	K4, K5

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	2	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	3	3	3	3	3	2	3	2
CO 4	3	3	3	3	3	3	3	2	3	2
CO 5	3	3	3	3	3	3	3	3	3	3

"1"– Slight (Low) Correlation
"2"– Moderate (Medium) Correlation
"3"– Substantial (High) Correlation
"-" indicates there is no correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Basic Concepts and Computer Evolution**: Organization and Architecture – Structure and Function. **A Top-level view of Computer Function and interconnection**: Computer Components – Computer function– Interconnection Structures – Bus Interconnection. **Cache Memory:** Computer Memory system overview – Cache memory principles – Elements of Cache design.	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Internal Memory**: Semi-conductor main memory – Error correction – DDR DRAM – Flash Memory. **External Memory:** Magnetic disk – RAID – Solid State Drives – Optical memory. **Input / Output:** I/O Modules – Programmed I/O – Interrupt Driven I/O- Direct Memory Access – Direct Cache Access – I/O Channels and Processors.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Number Systems**: The Decimal System – The Binary System – Converting between Binary and Decimal – Hexadecimal Notation. **Computer Arithmetic**: The Arithmetic and Logic Unit – Integer Representation – Integer Arithmetic – Floating Point Representation – Floating Point Arithmetic.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Instruction Sets: Characteristics and Functions**: Machine Instruction characteristics – Types of Operands – Intel x86 and ARM Data Types – Types of Operations. **Instruction Sets: Addressing Modes and Formats**: Addressing Modes – x86 and ARM Addressing Modes – Instruction Formats – Assembly Language. **Processor Structure and Function**: Processor Organization – Register Organization – Instruction Cycle – Instruction Pipelining.	17	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Reduced Instruction Set Computers:** Instruction Execution Characteristics – Compiler based Register Optimization – Reduced Instruction Set Architecture – RISC Pipelining. **Parallel Processing:** Multiple Processor Organization – Symmetric Multiprocessors – Multithreading and Chip Multiprocessors.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	**Self Study for Enrichment** **(Not to be included for End Semester Examination)** Embedded Systems –Hardware Performance Issues - Software Performance Issues – Multicore Organization – Micro Operations – Micro Instruction Sequencing	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. William Stallings(2017).*Computer Organization and Architecture*, 10th Edition, Pearson.

Reference Books

1. John. P. Hayes. (2017). *Computer Architecture and Organization*.3rd Edition, McGraw Hill Education.
2. C. Hamacher, Z. Vranesic, S.Zaky. (2011). *Computer Organization*. 5th Edition, McGraw Hill Education.
3. M.Morris Mano. (2007).*Computer System Architecture*. 3rdEdition, Prentice Hall.

Web References

1. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
2. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
3. https://www.learncomputerscienceonline.com/computer-organization-and-architecture/
4. https://www.britannica.com/science/computer-science/Architecture-and-organization

Pedagogy

Chalk and Talk, Power Point Presentation, Group discussion, Seminar.

Course Designer

Ms. S. Udhaya Priya

Semester V	Internal Marks: 25			External Marks: 75
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
22UCG5DSE1B	**PROCESS MANAGEMENT**	**DSE**	**5**	**4**

Course Objective

- To define, visualize, measure, monitor, and optimize processes
- To know the key principles, models and concepts of Process management
- To understand the risk management and event management concepts

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Define and summarize the process models in software industry	K1
CO2	Interpret and use the agile conceptsin process management	K2
CO3	Apply and correlate the principles of Scrum and DevOps	K3
CO4	Illustrate the strategies work of Design Thinking	K4
CO5	Plan and develop applications using Agile,Scrum and DevOps for real world scenario	K5

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	3	3	3	3	2	2	3
CO 2	3	3	3	2	2	3	3	3	3	3
CO 3	3	3	2	2	3	3	3	2	3	3
CO 4	3	3	3	3	2	2	3	2	3	3
CO 5	3	2	3	2	3	2	3	3	2	2

"1"–Slight (Low) Correlation
"2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation
"-"indicates there is no correlation.

Syllabus:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**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 - Specialized Process Model - The Unified Process - Software Engineering Code of Ethics.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Agile:** Introduction to Agile- Understanding Agile Value- Agile Manifesto- Principles of Agile- Agile Methodologies- Advantages and Disadvantages of Agile - Agile anti- patterns, Scaled Agile Framework- Why Lean UX-The Three Foundations of Lean UX- Principles of Lean UX.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Scrum:** Definition of Scrum- Uses of Scrum- Scrum Theory- Scrum Values- The Scrum Team-Scrum Events-Scrum Artifacts-Artifact Transparency.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**DevOps:** Introduction to DevOps- methodologies- principles, strategies- Automation- Performance Measurement through KPIS and Metrics-Agile and DevOps-Agile Infrastructure, Velocity- Lean Startup UPS.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**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	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not to be included for End Semester Examination)** Product and Process-Managing Software Projects- Conventional Methods for Software Engineering- Object Oriented Software Engineering	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Suggested Readings

1. Roger S.Pressman (2019).*Software Engineering A Practitioner's Approach*. 8th Edition, McGraw Hill Education.
2. Andrew Stellman, Jennifer Greene(2014).*Learning Agile*. 1stEdition, O'Reilly.
3. Kallori Vikram (2016).*Introduction to DevOps*.1st Edition.
4. Jonny Schneider(2017).*Understanding Design Thinking, Lean and Agile*. 1stEdition, O'Reilly Media.
5. Ken Schwaber, Jeff Sutherland(2017). *The Scrum Guide*.
6. Jeff Gothelf, Josh Seiden(2016).*Lean UX* . 2nd Edition, O'Reilly.
7. Jeff Gothelf(2017) .*Lean vs. Agile vs. Design Thinking*. 1stEdition, Sense and RespondPress.
8. S.Kenneth Rubin(2015).*Essential Scrum: A Practical Guide to the most popular Agile Process*. 1st Edition, Pearson Education.

Web References

1. https://www.javatpoint.com/software-engineering-agile-model
2. https://scrumguides.org/scrum-guide.html
3. https://www.techtarget.com/searchitoperations/definition/DevOps
4. https://designthinking.ideo.com/
5. https://www.tutorialspoint.com/software_engineering/
6. https://www.atlassian.com/agile/scrum
7. https://www.knowledgehut.com/blog/agile/what-is-agile-scrum
8. https://www.altexsoft.com/blog/engineering/devops-principles-practices-and-devops-engineer-role/
9. https://www.oreilly.com/library/view/understanding-design-thinking/9781491998410/toc01.html

Pedagogy

Power Point Presentation, Demonstration

Course Designer

TCS

Semester V	Internal Marks:25			External Marks:75
COURSE CODE	**COURSE TITILE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG5DSE1C	**COMPUTER GRAPHICS**	**DSE**	**5**	**4**

Course Objective

- To understand the fundamental concepts of Computer Graphics
- To have a knowledge about Clipping and Attributes
- To gain knowledge about 2D and 3D Transformations and Techniques

Course Outcomes

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

CO Number	CO Statement	Cognitive level
CO1	Define the basic concepts of Computer Graphics	K1
CO2	Explain about the basic principles of Graphics systems	K2
CO3	Describe the hardware system architecture for Computer Graphics	K2
CO4	Analyze and Apply algorithm to draw different mathematical objects	K3, K4
CO5	Access and Illustrate various 2D, 3D Geometric & modeling techniques	K3, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2	3	3	3	3	2
CO2	3	3	3	2	2	2	2	3	3	2
CO3	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	2	2	3	3	3	3	2
CO5	3	3	2	2	2	2	2	2	2	3

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"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HRs	COs	COGNITIVE LEVEL
I	**Overview of Computer Graphics System:** Video Display Devices – Raster Scan Systems –Random – Scan Systems - Graphics Monitors and Workstations – Input Devices – Hardcopy Devices –Graphics Software.	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
II	**Output Primitives:** Line Drawing Algorithms – Loading the Frame Buffer – Line Function –Circle – Generating Algorithms. **Attributes of Output Primitives:** Line Attributes – Curve Attributes –Color and Grayscale levels– Area fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
III	**2D Geometric Transformations:** Basic Transformation – Matrix Representations – Composite Transformations – Window to View port Co-Ordinate Transformations. **Clipping:** Point Clipping – Line Clipping – Cohen-Sutherland Line Clipping — Polygon Clipping –Sutherland-Hodgeman Polygon Clipping.	18	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
IV	**Graphical User Inter faces and Interactive Input Methods:** The User Dialogue – Input of Graphical Data – Input Functions –Interactive Picture Construction Techniques. **Three Dimensional Concepts:** 3D–Display Methods – Three Dimensional Graphics Packages	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
V	**3DGeometric and Modelling Transformations:** Translation – Scaling – Rotation – Other Transformations. **Visible Surface Detection Methods:** Classification of Visible Surface Detection Algorithm – Backface Detection – Depth-Buffer Method – A-Buffer Method – Scan-Line Method.	18	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
VI	**Self Study for Enrichment (Not to be included for End Semester Examination)** Applications of Computer Graphics - Virtual Reality Environments – Three-Dimensional Transformation Function – Viewing Pipeline – viewing Coordinates – projections – Clipping – Curve Clipping–Text Clipping.	-	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Text Book

1. Donald D.Hearn, M.PaulineBaker. (2022). *Computer Graphics C Version*, (2nd Edition). Pearson Education.

Reference Books

1. Sunil Kumar Sharma, Manoj Singhal. (2014). *Computer graphics,* Pearson Education.
2. William M.Neuman, Robert R.Sprout. (2000). *Principles of interactive Computer Graphics,* McGraw Hill International Edition.
3. Udit Agarwal. (2013). *Computer Graphics,* S.K.Kataria & Sons

Web References

1. www.tutorialspoint.com
2. http://math.hws.edu/graphicsbook
3. https://www.researchgate.net/publication/340315732_Lecture1_Computer_Graphics_Introduction
4. http://www.svecw.edu.in/Docs%5CCSECGLNotes2013.pdf
5. https://www.amazon.com/Computer-Graphics-Principles-Practice-2nd/dp/0201848406

Pedagogy

Quiz, Assignment, Chalk & Talk, PowerPoint Presentations, e-Content

Course Designer

Ms.N.Agalya

Semester V	Internal Marks: 40			External Marks: 60	
COURSE CODE	COURSE TITLE	CATEGORY	HRS. /WEEK		CREDITS
			T	P	
22UCG5SEC1P	VIRTUALIZATION & CLOUD (P)	SEC	-	2	2

Course Objective

- To install and create Virtual Machines in Workstation Player
- To apply the knowledge of how to Install and Upgrade VMware Tools
- To Implement how to configure various Virtual Machine Hardware Settings

Course Outcomes and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	Demonstrate the workstation Player Preference settings	K2
CO2	Apply the knowledge to install, upgrade and configure on VMware tools	K3
CO3	Examine the knowledge on Virtual Machines	K4
CO4	Analyze the hardware settings of the Virtual Machines	K4
CO5	Assess the Network connections	K5

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	1	3	2	1	1	3	2	1	2	2
CO2	2	3	3	2	2	3	3	1	3	3
CO3	3	3	3	2	2	3	3	1	3	2
CO4	3	2	3	3	2	3	3	1	3	3
CO5	3	3	3	1	1	3	2	1	3	2

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation

"3"–Substantial (High) Correlation "-"indicates there is no correlation

Practical

List of Exercises:

1. Installing and Using Workstation Player
    a. Install Workstation Player on a Windows Host
    b. Start Workstation Player
    c. Use the Workstation Player Window
2. Changing Workstation Player Preference Settings
    a. Configuring Close Behavior Preference Settings
    b. Configuring Software Updates Settings
    c. Configuring Workstation Player Color Theme Settings
3. Creating Virtual Machines in Workstation Player
    a. Preparing to Create a Virtual Machine
    b. Create a Virtual Machine
4. Installing and Upgrading VMware Tools
    a. Installing VMware Tools
    b. Upgrading VMware Tools
    c. Configure Software Update Preferences
    d. Configure VMware Tools Updates for a Specific Virtual Machine
5. Starting and Stopping Virtual Machines in Workstation Player
    a. Start a Virtual Machine in Workstation Player
    b. Power Off a Virtual Machine in Workstation Player
    c. Use Ctrl+Alt+Delete to Shut Down a Guest
    d. Suspend and Resume a Virtual Machine in Workstation Player
    e. Reset a Virtual Machine in Workstation Player
6. Changing the Virtual Machine Display
    a. Configure Display Settings for a Virtual Machine
    b. Use Full Screen Mode in Workstation Player
7. Configuring and Managing Virtual Machines
    a. Change the Name of a Virtual Machine
    b. Change the Working Directory for a Virtual Machine
    c. Change the Virtual Machine Directory for a Virtual Machine
    d. Change the Memory Allocation for a Virtual Machine
    e. Moving Virtual Machines
    f. Delete a Virtual Machine
8. Configuring and Managing Devices
    a. Configuring DVD, CD-ROM, and Floppy Drives
    b. Configuring and Maintaining Virtual Hard Disks
    c. Configuring Keyboard Features
    d. Modify Hardware Settings for a Virtual Machine
9. Configuring Network Connections
    a. Understanding Common Networking Configurations
    b. Configuring Bridged Networking
    c. Configuring Network Address Translation
    d. Configuring Host-Only Networking
    e. Changing a Networking Configuration
10. Configuring Virtual Machine Option Settings
    a. Configuring General Option Settings for a Virtual Machine

b. Configuring Power Options for a Virtual Machine
c. Configuring VMware Tools Options for a Virtual Machine

11. Configuring Virtual Machine Hardware Settings
    a. Adding & Removing Hardware to a Virtual Machine
    b. Adjusting Virtual Machine Memory
    c. Configuring Virtual Machine Processor Settings
    d. Configuring and Maintaining Virtual Hard Disks
    e. Configuring Virtual Network Adapter Settings
    f. Configuring Display Settings

Resources

Lab Requirements:

- Download VMware Workstation Player
  https://customerconnect.vmware.com/en/downloads/info/slug/desktop_end_user_computing/vmware_workstation_player/16_0

Web References

User Guide: Using VMware Workstation Player for Windows
https://docs.vmware.com/en/VMware-Workstation-Player-for-Windows/16.0/com.vmware.player.win.using.doc/GUID-B8509247-258C-4B11-8637-5DABACEA4965.html

Course Designer

TCS

Semester V	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS./ WEEK**	**CREDITS**
24UCG5INT	**INTERNSHIP**	**INTERNSHIP**	**-**	**2**

Objective

- At the end of Semester III, the students should undergo an internship in a reputed IT company or IT division of reputed company
- Minimum number of days for the internship is 15 days
- A project report and a certificate of attendance are to be submitted after completing the internship

EVALUATION PATTERN FOR INTERNSHIP

Internal Components	Marks	External Components	Marks
Institution Profile	5	Regularity	10
Presentation skill	10	Problem solving	10
Report Evaluation	10	Participation and Hands – on training	20
		Professional Attitude	15
		Report Writing	20
Total	**25**	**Total**	**75**

SEMESTER VI

Semester VI	Internal Marks: 50			External Marks:50	
COURSE CODE	COURSE TITLE	CATEGORY	HRS. / WEEK		CREDITS
			T	P	
23UCG6CC12	PYTHON PROGRAMMING (T & P)	CORE	4	2	5

Course Objective

- To understand the concepts of Python programming language
- To understand the knowledge of Operators, Functions and Strings
- To inculcate the knowledge of Graphics programming in Python

Course Outcome and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENTS	COGNITIVE LEVEL
CO1	Recall the fundamental concepts of Python	K1
CO2	Demonstrate the problem-solving approach using Python statements	K2
CO3	Construct the Python programme using functions	K3
CO4	Analyze the Python programming concepts to develop programs	K4
CO5	Develop a Python program to solve real time problems	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	1	2	3	3	3	3	3
CO2	3	3	3	1	2	3	3	2	3	3
CO3	3	3	3	2	3	3	3	3	3	2
CO4	2	3	2	3	2	3	2	3	2	2
CO5	3	3	2	2	2	3	2	3	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
" - " indicates there is no Correlation

Syllabus

Theory

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Basics of Python Programming:** Introduction: Python Character Set – Token - Python Core Data Type - The *print ( )* Function - Assigning value to a variable - Multiple Assignments - Writing Simple Programs in Python - The *input( )* Function - The *eval( )* Function- Formatting Number and Strings - Python Inbuilt Functions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Operators & Expressions:** Operators and Expressions - Arithmetic Operators - Operator Precedence and Associativety - Bitwise Operator. **Decision Statement:** Boolean Operators - Using Numbers with Boolean Operators - Using String with Boolean Operators - Boolean Expressions and Relational Operators.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Decision Statement:** Decision-Making Statements: Conditional Expressions. **Loop control Statements:** The *while* Loop - The *range( )* Function-The *for* Loop - Nested Loops - The *break* Statement - The *continue* Statement.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Functions, Strings, Lists & Tuples** Syntax and Basics of a Function - Use of a Function - Parameters and Arguments in a Function - The Local and Global Scope of a Variable - The *return* Statement - Recursive Functions - The Lambda Function. **Strings:** The *str* class Immutable Strings - String Operators - String Operations. **Dictionaries:** Creating a dictionary, Accessing values, Modifying an Entry -Deleting items – Built- in Dictionary Functions and Methods - Difference between a List and a Dictionary. **Lists:** Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. **Tuple:** Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4 ,K5

V	**Modules: The from…import statement- Name of Module – The dir () function – Modules and Namespace.** **File Handling:** Types of files in Python - Opening and Closing files- **Reading and Writing files**: write() and writelines() methods- append() method – read() and readlines() methods – Splitting words –File Positions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	**Self Study for Enrichment** **(Not to be included for End Semester Examination)** Difference between lists and tuples - Defining our own modules- Renaming and deleting files. **Exception Handling:** Errors and Exceptions – Handling Exception.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. 1. Ashok Namdev Kamthane, Amit Ashok Kamthane (2018). Programming and Problem Solving with Python. (2nd Edition). MC Graw Hill Education (Units I, II & III)
2. Reema Thareja. (2017), Python Programming using problem solving approach, 1st Edition, Oxford University Press. (Units IV, V)

Reference Books

1. Jeeva Jose and P. Sojan Lal (2016). Introduction to Computing and Problem Solving with Python, (1st Edition). Khanna Book Publishing
2. Ch. Satyanarayana, M Radhika Mani & B N Jagadesh (2018). *Python Programming.* (Kindle Edition). Universities Press.

Web References

1. https://www.tutorialspoint.com/python/index.htm
2. https://www.guru99.com/python-tutorials.html
3. https://www.programiz.com/python-programming

Practical

List of Exercises

1. Program using Strings
2. Program using Functions
3. Program using Modules.
4. Program using Lists.
5. Program using Tuples.
6. Program using Dictionaries.
7. Program for File Handling.

Web References

1. https://www.shahucollegelatur.org.in/practical.pdf
2. https://www.w3schools.com/python/python_operators.asp
3. https://mindmajix.com/python/basic-operators-in-python
4. https://www.cs.otago.ac.nz/staffpriv/mccane/Downloads/PracticalProgramming.pdf

Pedagogy

Chalk & Talk, PowerPoint Presentation, Demonstration e-Content

Course Designers

Dr.H.Krishnaveni

Semester: VI	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
23UCG6CC13	**DATA STRUCTURES & ALGORITHMS**	**CORE**	**6**	**5**

Course Objective

- To learn the concept of Data Structure and different ways of organizing data and performing various operations on that data.
- To articulate the essential components of data structures like Stack, Queue, List, Trees& Graphs.
- To get familiarize knowledge with designing an algorithm using data structures

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive level
CO1	Recognize and Understand data organization, data structure operations	K1,K2
CO2	Design the various types of algorithms and data structure	K2,K3
CO3	Demonstrate problems to represent the linear and nonlinear structures by recognizing its memory representation and traversal techniques.	K3,K5
CO4	Implement and evaluate various techniques of algorithms using suitable data structures.	K4,K5
CO5	Analyze the different design technique of algorithm and recommend the technique for practical problems	K4,K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2	3	3	3	3	2
CO2	3	3	3	3	2	3	3	3	3	2
CO3	3	3	3	3	3	3	3	3	3	2
CO4	3	3	2	2	2	2	2	2	2	2
CO5	3	3	2	2	2	2	2	2	2	2

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" indicates there is no correlation

Syllabus

UNIT	CONTENT	HOURs	COs	COGNITIVE LEVEL
I	**Data Structures** **Introduction and Overview**: Introduction- Basic Terminology –Data Structures- Data Structure Operations. **Arrays** – Introduction – Linear Arrays-Representation of Linear Arrays in Memory-Traversing Linear Arrays-Multidimensional Arrays-Two Dimensional Arrays – Representation of Two Dimensional Arrays in Memory. **Stacks& Queues:** Stacks-Array Representation of Stacks - Arithmetic Expressions, Polish Notation – Recursion – Queues– Deques-Priority Queues.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
II	**Linked Lists:** Overview of Linked List – Representation of Linked Lists in Memory – Traversing a Linked List –Searching a Linked List-Memory allocation; Garbage Collection-Insertion into a Linked List – Deletion from a Linked List – Two-way Lists – Operations on Two-way Lists.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
III	**Trees & Graphs: Trees:** Introduction- Binary Trees – Representing Binary Trees in Memory – Traversing Binary Trees – Header nodes ;Threads –Binary Search Trees. **Graphs**: Graph Theory Terminology – Sequential Representation of Graphs: Adjacency Matrix, Path Matrix – Linked representation of a Graph– Traversing a Graph.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
IV	**Algorithm** **Introduction:** Algorithm-Algorithm Specification-Performance Analysis-**Divide & Conquer:** General method- Binary Search-Finding maximum and minimum-Merge Sort-Quick sort. **The Greedy Method:** General Method - Knapsack Problem – Job Sequencing With Deadlines.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
V	**Dynamic programming:** General method-All-pairs shortest paths-Single source shortest path-Travelling Sales Person problem. **Back tracking:** The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
VI	**Self Study for Enrichment** **(Not To Be Included for End Semester Examinations)** Linear search-Sorting list elements-Searching and inserting elements in binary search trees- Spanning trees-Minimum cost spanning trees-Insertion sort-Bubble sort- Selection Sort- Heap Sort- Branch and bound method.	-	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Text Books

1. Seymour Lipschutz. (2008).*Data Structures*, McGraw Hill Education India Private Limited, New Delhi, Revised First Edition.(**Unit I, II & III**)
2. EllisHorowitz,SartajSahni and Sanguthevar Rajasekaran,(2015), *Fundamentals of Computer Algorithms*,2nd Edition, Universities Press.(**Unit IV& V**)

Reference Books

1. Jean-Paul Tremblay and Paul G. Sorenson,(2017) , *An Introduction to Data Structures with Applications.* Second Edition. Tata McGraw-Hill, New Delhi.
2. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman.(2006).*Data Structures and Algorithms.* Pearson Education, New Delhi.
3. Ellis Horowitz, Sartaj Sahni.(2010),*Fundamentals of Data Structure.* Galgotia Publications.

Web References

1. www.studytonight.com/data-structures
2 https://lpuguidecom.files.wordpress.com/2017/04/fundamentals-of-data-structures-ellis-horowitz-sartaj-sahni.pdf
3 https://www.slideshare.net/canaokar/fundamentals-of-computer-algorithms-by-horowitz-sahni-rajsekaran
4. https://www.geeksforgeeks.org/data-structures/

Pedagogy

Chalk & talk, Assignment, Power Point Presentation, Seminar, e-Content.

Course Designer

Ms.K.Sangeetha

Semester VI	Internal Marks:25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
22UCG6DSE2A	**ARTIFICIAL INTELLIGENCE**	**DSE**	**5**	**4**

Course Objective

- To impart the basic concepts, theories and state-of the art techniques of artificial intelligence
- To inculcate problem solving methodologies in the search space
- To learn about the future trends of robotics

Course Outcome and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	Understand the fundamentals of Artificial Intelligence (AI) and expert systems.	K1
CO2	Identify the type of search strategy that is more appropriate to address a particular problem and implement the selected strategy	K3
CO3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	K3
CO4	Analyze the future trends of AI applications	K4
CO5	Assess the importance of knowledge representation in intelligent and expert systems	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**

"1"-Slight (Low) Correlation "2"-Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" - Indicates there is no Correlation

Syllabus:

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Artificial Intelligence (AI):** Computerized Reasoning - Turing Test - What is Intelligence? - Artificial Intelligence -Goals of Artificial Intelligence - History of Artificial Intelligence - Advantages of Artificial Intelligence -Application Areas of Artificial Intelligence - Components of Artificial Intelligence	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Problem representation:** Introduction - Problem Characteristics - Problem - Representation in AI - Production System - Conflict Resolution **The Search Process:** Search Process - Strategies for Search - Search Techniques	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Game playing:** Game Playing - Game Tree -Components of a Game Playing Program - Game Playing Strategies - Problems in Computer Game Playing Programs **Knowledge Representation:** Introduction - Definition of Knowledge - Importance of Knowledge - Knowledge-Based Systems - Differences Between Knowledge-Based Systems and Database Systems - Knowledge Representation Scheme	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Expert systems :** Introduction - Definition of an Expert System- Characteristics of an Expert System - Architectures of Expert Systems - Expert System Life Cycle - Knowledge Engineering Process - Knowledge Acquisition - Difficulties in Knowledge Acquisition - Knowledge Acquisition Strategies - Advantages of Expert Systems- Limitations of Expert Systems - Examples of Expert Systems	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Learning:** General Model for Machine Learning Systems - Characteristics of Machine Learning - Types of Learning - Advantages of Machine Learning - Disadvantages of Machine Learning – **PROLOG** - Preliminaries of Prolog - Milestones in Prolog Language Development - What is a Horn Clause? - Robinson's Resolution Rule - Parts of a Prolog Program - Queries to a Database - How does Prolog Solve a Query? - Compound Queries - The _ Variable -	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

	Recursion in Prolog - Data Structures in Prolog - Head and Tail of a List - Print all the Members of the List - Print the List in Reverse Order - Appending a List - Find Whether the Given Item is a Member of the List Finding the Length of the List - Controlling Execution in Prolog - About Turbo Prolog			
VI	**Self Study for Enrichment (Not to Be included for End Semester Examinations)** **Artificial intelligence machines and robotics**- Introduction - Technical Issues - Applications: Robotics in the Twenty-First Century	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Neeru Gupta, Ramita Mangla (2020). ***Artificial Intelligence Basics: A Self-Teaching Introduction,*** Mercury Learning and Information
2. Prateek Joshi (2017).*Artificial Intelligence with Python*, Packt Publishing Limited.

Reference Books

1. Stuart J. Russell and Peter Norvig (2016).*Artificial Intelligence: A Modern Approach* – Global Edition, Pearson
2. Elaine Rich, Kevin Knight, Shivashankar B Nair (2017).*Artificial Intelligence*, 3rd edition, Tata McGraw Hill

Web References

1. https://intellipaat.com/course-cat/artificial-intelligence-and-machine-learning-courses/
2. https://www.youtube.com/hashtag/machinelearningprojectusingpython
3. https://cse.iitk.ac.in/users/cs365/2013/readings/am-lecs-intro.pdf

Pedagogy

Chalk & Talk, Power Point Presentation, Assignment, Seminar, e-Content

Course Designer

Dr. .Tamilselvi

Semester VI	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./ WEEK**	**CREDITS**
22UCG6DSE2B	**NETWORK SECURITY**	**DSE**	**5**	**4**

Course Objective

- To provide the fundamental concepts of Network Security
- To analyze various encryption techniques
- To learn the algorithms used for encryption

Course Outcomes and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENTS	COGNITIVE LEVEL
CO1	Define and summarize the basic concepts of network security	K1, K2
CO2	Classify and explain the techniques for encryption	K2, K5
CO3	Understand and apply the encryption algorithms	K2, K3
CO4	Summarize and analyze the network and internet security	K2, K4
CO5	Discuss and explain security features for system security	K2, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	1	3	3	2	3	3
CO2	3	3	3	2	3	3	3	1	2	3
CO3	3	3	3	3	3	3	3	2	1	3
CO4	3	2	2	3	2	3	3	2	2	3
CO5	3	2	3	2	2	3	3	2	2	2

"1" - Slight (Low) Correlation
"2" - Moderate (Medium) Correlation
"3" - Substantial (High) Correlation
"-" – Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Computer and Network Security Concepts**: Computer Security Concepts – OSI Security Architecture - Security Attacks - Security Services - Security Mechanism - A Model for Network Security - **Classical Encryption Techniques**: Symmetric cipher model - Substitution Techniques.	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Block Ciphers and the Data Encryption Standard:** Data Encryption Standard - An Example DES - The strength of DES -**Advanced Encryption Standard:** AES Structure- AES Transformation Functions - AES Key Expansion.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Block Cipher Operation:** Electronic CodeBook – Cipher Block Chaining Mode – Cipher Feedback Mode – Output Feedback Mode – Counter Mode - **Public key Cryptography and RSA:** Principles of Public-key Cryptosystems - The RSA Algorithm.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Key Management and Distribution:** Symmetric-Key Distribution Using Symmetric Encryption - **Symmetric**-Key Distribution Using Asymmetric Encryption - Distribution of Public keys - X-509 Certificates - Public-key Infrastructure - **User Authentication:** Remote User-Authentication Principles - Remote User Authentication using Symmetric Encryption - Kerberos - Remote User Authentication using Asymmetric Encryption.	17	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Network and internet Security: Electronic Mail Security:** Email formats – Email Threats and Comprehensive Email Security – S/MIME – Pretty Good Privacy – **IP security**: IP Security overview – IP Security policy – Encapsulating Security Payload.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** Malicious Software - Intruders - Firewalls	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. William Stallings. (2018).*Cryptography & Network Security.* (7th Edition). Pearson Education.

Reference Book

1. Charlie Kaufman, Radia Perlman, Mike Speciner.(2002). *Network Security.* (2nd Edition). Private communication in public world.PHI.

Web References

1. https://www.slideshare.net/gangadhar9989166446/network-security-cryptography-full-notes.
2. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf

Pedagogy

Chalk and talk, Power Point Presentation, e-Content

Course Designer

Dr. S. Latha

Semester VI	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS. /WEEK**	**CREDITS**
22UCG6DSE2C	**BIG DATA & IOT**	**DSE**	**5**	**4**

Course Objective

- To become familiar with the fundamental concepts of Big Data.
- To provide an overview of apache Hadoop.
- To learn the tools and techniques for handling large datasets.
- To understand the concepts of Internet of things.

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Recall the overview and its classifications of a growing field of big data analytics, Big data technology and IoT	K1
CO2	Relate HADOOP and MAPREDUCE, IoT and M2M	K2
CO3	Apply NoSQL, MongoDB Queries and IoT technology	K3
CO4	Infer knowledge from Big data and IoT applications	K4
CO5	Recommend the required features of Bigdata and IoT for Real time environment	K5

Mapping of CO with PO and PSO

COs/POs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	2	2	3	1	3	3
CO2	3	2	3	3	2	2	3	2	3	2
CO3	3	3	3	2	2	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	2	3	2	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Types of Digital Data**: Classification of Digital Data - Characteristics of Data-Evolution of Big Data-Definition of Big Data-Challenges with Big Data- Characteristics of Big Data-Other characteristics of data - Need for Big Data. **Big Data Analytics:** Characteristics of Big Data analytics- Need for Big Data analytics-Classification of analytics-Greatest challenges that prevent businesses from capitalizing on Big Data – Importance of Big Data analytics – Data science-Data scientist- Terminologies used in Big Data environments-Analytics tools.	16	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
II	**Big data Technology**: NoSQL - Hadoop. Introduction to Hadoop: Introducing Hadoop-Need for Hadoop-Limitations of RDBMS - RDBMS versus HADOOP-History of Hadoop – Hadoop overview-Interacting with Hadoop ecosystem –HDFS - Processing Data with Hadoop MapReduce – Managing resources and applications with Hadoop YARN-Introduction to MAPREDUCE programming.	16	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
III	**Introduction to MongoDB**: Need for MongoDB - Terms used in RDBMS and MongoDB - Data types in MongoDB- MongoDB Query Language	13	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
IV	**Introduction to IoT**: Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates – Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Logistics – Retail – Agriculture.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
V	**IoT and M2M:** Introduction – M2M – Different between IoT and M2M – SDN and NFV for IoT– IoT System Management with NETCONF-YANG: Simple Network Management Protocol (SNMP)- Network operator Requirement.	15	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** Columnar Database – NoSQL Queries -IoT solutions using Raspberry Pi and Arduino simulator	-	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Text Books

1. Seema Acharya, S. C. (2015). *Bigdata and Analytics*, Wiley India Pvt Ltd, Bengaluru **(Unit I – III)**

2. ArshdeepBahga, Vijay Madisetti. (2014*). Internet of Things A Hands on Approach*, University press**(Unit IV – V)**

Reference Books

1. V.K.Jain .(2017).*Big Data and Hadoop.* Khanna Book Publishing Co.(P) Ltd

2. V.BhuvaneswariT.Devi. (2016).*Bigdata Analytics A Practioner's Approach,*

Bharathiyar University, Coimbatore

3. Raj Kamal(2017),*Internet of things Architecture and Design Principles,* McGraw Hill

4. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton. (2017),*IoT*

*Fundamentals, Networking Technologies.*Cisco Press

Web References

1. https://www.mongodb.com/
2. https://www.tutorialspoint.com/cassandra/index.html
3. https://www.edureka.co/blog/mapreduce-tutorial/
4. https://github.com/connectiot/iottoolkit
5. https://www.arduino.cc/
6. https://www.tutorialspoint.com/
7. https://emerging-researchers.org/wp-content/uploads/2021/03/ahmed_a_le6.pdf

Pedagogy

Chalk and talk, PPT, e-Content

Course Designer

1. Dr.J.Sangeetha
2. Dr.M.Anandhi
3. Dr.A.Bhuvaneswari

Semester VI	Internal Marks:40			External Marks:60
COURSE CODE	COURSE TITLE	CATEGORY	HRS./ WEEK	CREDITS
			T / P	
22UCG6SEC2P	HTML, CSS, JavaScript (P)	SEC	- / 2	2

Course Objective

- To recognize and code the basic structure of web page
- To design and implement static and dynamic website
- To develop web based application using suitable browser side scripting language

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand the basic concept of web design	K2
CO2	Apply custom styles to style the web	K3
CO3	Build real time web applications	K3
CO4	Analyze a web page and identify its elements and attributes	K4
CO5	Compare static and dynamic web page	K5

Mapping of CO with PO and PSO

CO s	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	2	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no Correlation

List of Exercises

1. Write a HTML program for the demonstration of Tags, List, Hyperlinks, Multimedia and Map.
2. Write a HTML program using Tables.
3. Design Student Registration Form in HTML.
4. Write a HTML program to develop a Static web page.
5. Develop and demonstrate the usage of inline, internal and external style sheet using CSS.
6. Design a webpage using CSS classes and the class attribute.
7. Write a JavaScript program to validate User Registration page
    a) First Name (Name should contain alphabets and the length should not be less than 6 characters)
    b) Password (Length of the password should not be less than 6 characters)
8. Write a JavaScript program to perform different Mathematical operations.
9. Demonstrate JavaScript Event-Handler.
10. Demonstrate Database connectivity in JavaScript.

Web References

1. https://www.w3schools.com/html/html_scripts.asp
2. https://www.studytonight.com/javascript/javascript-events
3. https://www.tutorialspoint.com/html/html_basic_tags.htm
4. https://www.javatpoint.com/javascript-form-validation

Pedagogy

Power Point Presentation, Demonstration

Course Designer

Ms.R.Ramya

Semester VI	Internal Marks: -		External Marks: 100	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCG6PW	**PROJECT WORK**	**PROJECT**	**5**	**4**

Course Objective:

- To build problem solving ability and technical skills through the application of theoretical concepts for modeling the real world problems using latest technologies

Project Evaluation

The project work shall be done by either an individual or a group of students. Two components will be considered in assessing the project work:

- Dissertation
- Viva Voce

The Dissertation/Project work submitted will be evaluated based on the following components:

- Problem Identification
- Domain Knowledge
- Documentation
- Presentation