BCA



Program Code: UCA

2023 - Onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A⁺" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Academic Council Meeting Held On 17.04.2025

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI – 625 004

BACHELOR OF COMPUTER APPLICATIONS CURRICULUM

(For the students admitted from the academic year 2023-2024 onwards)

Course Code Title of the Course I		Hrc	Crodite	Maxi	mum N	larks
Course Coue	The of the Course	1115	Creans	Int	Ext	Total
	FIRST SEMESTER					
Part – I	Tamil / Hindi Course					
23UTAGT11	தமிழ் இலக்கிய வரலாறு - I					
/	1	6	3	25	75	100
23UHIGH11	Hindi Ka Samanya Gyan Aur Nibandh					
Part – II	English					
23UENGE11	General English - I	6	3	25	75	100
Part - III	Core Courses					
23UCACC11	Python Programming	5	5	25	75	100
23UCACP11	Python Programming Lab	5	5	25	75	100
Part - III	Elective Course					
23UMTEA12	Numerical Methods	4	25	75	100	
Part IV	Non Major Elective					
23UCANM11	Office Automation	2	2	25	75	100
Part IV	Foundation Course					
23UCAFC11	Structured Programming in C	2	2	25	75	100
	Total	30	23	175	525	700
	SECOND SEMESTE	R				
Part – I	Tamil / Hindi Course					
23UTAGT21	தமிழ் இலக்கிய வரலாறு – II					
/	1	6	3	25	75	100
23UHIGH21	Katha Sahitya Aur Vyakaran					
Part – II	English					
23UENGE21	General English - II	6	3	25	75	100
Part - III	Core Courses					
23UCACC21	Object Oriented Programming Concepts	5	5	25	75	100
2300110021	Using C++	•				
23UCACP21	C++ Programming Lab	5	5	25	75	100
Part - III	Elective Course					
23UCAEC21	Introduction to Data Science	4	3	25	75	100
Part IV	Non Major Elective					
23UCANM21	Understanding Internet	2	2	25	75	100
Part IV	Skill Enhancement course					
23UCASP21	Advanced Excel Lab	2	2	25	75	100
	Total	30	23	175	525	700

Course Code	IJma	Credita	Maximum Marks			
Course Code	The of the Course	Hrs	Creans	Int	Ext	Total
	THIRD SEMESTER					
Part – I	Tamil / Alternative course					
23UTAGT31	தமிழக வரலாறும் பண்பாடும்					
/	1	6	3	25	75	100
23UHIGH31	Patra Lekhan Aur Paribhashik Shabdavali					
Part – II	English					
23UENGE31	General English - III	6	3	25	75	100
Part - III	Core courses					
23UCACC31	Data Structures and Algorithms	5	5	25	75	100
23UCACP31	Data Structures and Algorithms Lab	5	5	25	75	100
Part - III	Elective course					
23UMTEA31	Statistical Methods and Its Application	4	3	25	75	100
Part - IV	Skill Based courses					
23UCASC31	Multimedia Systems	1	1	25	75	100
23UCASP31	Introduction to HTML Lab	2	2	25	75	100
Part - IV	Mandatory course					
23UEVSG41	Environmental Studies	1	-	-	-	-
	Total	30	22	175	525	700
	FOURTH SEMESTE	R				
Part – I	Tamil / Alternative course					
23UTAGT41	தமிமும் அறிவியலும்					
/		6	3	25	75	100
23UHIGH41	Hindi Bhasha Aur Computer					
Part – II	English					
23UENGE41	General English - IV	6	3	25	75	100
Part - III	Core courses					
23UCACC41	Programming in Java	5	5	25	75	100
23UCACP41	Programming in Java Lab	5	5	25	75	100
Part - III	Elective course					
23UCAEC41	Database Management System	3	3	25	75	100
Part - IV	Skill Based courses					
23UCASC41	Biometrics	2	2	25	75	100
23UCASP41	PHP Programming Lab	2	2	25	75	100
Part - IV	Mandatory course					
23UEVSG41	Environmental Studies	1	2	25	75	100
	Total	30	25	200	600	800

Course Code	Hre	Credi	Maximum Marks				
Course Code	The of the Course	nrs	ts	Int	Ext	Total	
	FIFTH SEMESTER	ł					
Part - III	Core courses						
23UCACC51	Operating System	5	4	25	75	100	
23UCACC52	ASP.Net Programming	5	4	25	75	100	
23UCACP51	ASP.Net Programming Lab	5	4	25	75	100	
Part - III	Core project						
23UCAPR51	Project with Viva - Voce	5	4	25	75	100	
Part - III	Elective courses - I						
23UCAEC51	Big Data Analytics						
23UCAEC52	Software Project Management	4	3	25	75	100	
23UCAEC53	Computational Intelligence						
Part - III	Elective courses - II						
23UCAEC54	Artificial Intelligence						
23UCAEC55	Cloud Computing	4	3	25	75	100	
23UCAEC56	Information Security						
Part - IV	Mandatory course						
23UVLEG51	Value Education	2	2	25	75	100	
23UCAIN51	Internship Report	-	2	25	75	100	
	Total	30	26	200	600	800	
	SIXTH SEMESTE	R					
Part - III	Core courses						
23UCACC61	Computer Networks	6	4	25	75	100	
23UCACC62	Data Analytics Using R Programming	6	4	25	75	100	
23UCACP61	R Programming Lab	6	4	25	75	100	
Part - III	Elective courses - I						
23UCAEC61	IoT and Its Applications						
23UCAEC62	Image Processing	5	3	25	75	100	
23UCAEC63	Human Computer Interaction						
Part – III	Elective courses - II						
23UCAEC64	Cryptography						
23UCAEC65	Analytics for Service Industry	5	3	25	75	100	
23UCAEC66	Natural Language Processing						
Part - IV	Skill course						
23UCASP61	Cyber Forensics Lab	2	2	25	75	100	
Part - V	Extension activities						
23UNCET61,							
23UNSET61,							
23UPEET61,	NCCNSS Physical Education RRC						
23URRET61,	Y R C Health and Fitness Club ECO Club	-	1	25	75	100	
23UYRET61,	& Human Rights Club		-	_0			
23UHFET61,							
23UEOE161 &							
23UHKE101		20	01	1/7 -	FOF	700	
		3U	21	175	525	700	
	Grand total	180	140	1100	3300	4400	



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Operating System			
Course Code	23UCACC51	L	Р	С
Category	Core	5	-	4
COUDOD OD ID				

COURSE OBJECTIVES:

- > Understanding the design of the Operating System.
- > Imparting knowledge on CPU scheduling, process, and memory management.
- > To code specialized programs for managing overall resources and operations of the computer.
- > To study about the concept of job and processor scheduling.
- > To learn about the concept of memory organization and multiprogramming.

UNIT - I **Introduction, Process Concepts**

Introduction: Operating System, History (1990s to 2000 and Beyond), Distributed Computing, Parallel Computation.

Process Concepts: Definition of Process, Process States - Lifecycle of a Process, Process Management -Process State Transitions, Process Control Block (PCB), Process Operations, Suspend and Resume, Context Switching, Interrupts - Interrupt Processing, Interrupt Classes, Interprocess Communication -Signals, Message Passing.

UNIT - II Asynchronous Concurrent Processes, Semaphores

Asynchronous Concurrent Processes: Mutual Exclusion - Critical Section, Mutual Exclusion Primitives, Implementing Mutual Exclusion Primitives, Peterson's Algorithm, Software Solutions to the Mutual Exclusion Problem, n-thread Mutual Exclusion - Lamport's Bakery Algorithm.

Semaphores: Mutual Exclusion with Semaphores, Thread Synchronization with Semaphores.

UNIT - III Deadlock and Indefinite Postponement

Deadlock and Indefinite Postponement: Resource Concepts, Four Necessary Conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance and Dijkstra's Banker's Algorithm, Deadlock Detection, Deadlock Recovery.

UNIT - IV Job and Processor Scheduling, Algorithms

Job and Processor Scheduling: Scheduling Levels, Scheduling Objectives, Scheduling Criteria, Preemptive vs Non-Preemptive Scheduling, Interval Timer or Interrupting Clock, Priorities, Scheduling Algorithms - FIFO Scheduling, RR Scheduling, Ouantum Size, SJF Scheduling, SRT Scheduling, HRN Scheduling, Multilevel Feedback Queues, Fair Share Scheduling.

UNIT - V Real Memory Management, Virtual Memory Management

Real Memory Management: Memory Organization, Memory Management, Memory Hierarchy, Memory Management Strategies, Contiguous vs Non-Contiguous Memory Allocation, Single User Contiguous Memory Allocation, Fixed Partition Multiprogramming, Variable Partition Multiprogramming, Memory Swapping.

Virtual Memory Management: Virtual Memory Basic Concepts, Multilevel Storage Organization, Block Mapping, Paging Basic Concepts, Segmentation, Paging/Segmentation Systems, Demand Paging, Page Replacement Strategies.

Total Lecture Hours

75

15

15

15

15

BOOKS FOR STUDY:

> H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011.

BOOKS FOR REFERENCES:

- William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
- A. Silberschatz, and P.B. Galvin, Operating Systems Concepts, Ninth Edition, John Wiley & Sons (ASIA) Pte Ltd., 2012.

WEB RESOURCES:

- https://www.w3schools.com/java
- http://java.sun.com
- http://www.afu.com/javafaq.html

Nature of Course	EMPLOYABILITY			1	SF	SKILL ORIENTED			ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REG	IONAL	, NATIONAL			GLOBAL	~			
Changes Made in the Course	Percentage of Change			30%		No Changes Made				New Course		
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COUR	SE OUTCO	OMES:							ŀ	K LEVEL
After st	udying this	course, th	e students	will be al	ole to:					
CO1	Define the lifecycle, s	e fundamer scheduling	ntals of OS algorithms	and iden , deadlock	tify the co	oncepts rel	evant to p ement.	rocess, pro	ocess	K1 to K4
CO2	Know the threads and	critical and d semaphor	nalysis of ₁ res.	processes	involving	various al	gorithms,	an exposu	re to	K1 to K4
CO3 Have a complete study about deadlock and its impact over OS. Knowledge of handling deadlock with respective algorithms and measures to retrieve from deadlock.									dling	K1 to K4
CO4	CO4 Have complete knowledge of scheduling algorithms and its types.									K1 to K4
CO5	Understand	d memory	organizatio	n and man	agement.				I	K1 to K4
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	М	M	M	L	M	M	M	М	M
CO2	S	S	М	М	М	L	Μ	Μ	Μ	M
CO3	CO3 M L M S M S M M M							М	M	
CO4	M M M M S S M M L									M
CO5	M	M	S	L	М	Μ	Μ	S	Μ	M
S- STRONG M – MEDIUM L - LO										

CO / PO MAPPING:										
C	os	PSO1	PSO2	PSO3	PSO4			PSO5		
C	01	3	1	2	2			1		
С	0 2	2	3	2	2			2		
С	03	3	2	1	3			1		
C	04	1	3	2	1			3		
С	05	3	1	2	2 3			2		
WEIG	HTAGE	12	10	9	11			9		
WEIC PERCI OF C CONTI N TC	WEIGHTED ERCENTAGE OF COURSE 80 67 60 73 CONTRIBUTIO N TO POS							60		
LESSON PLAN:										
UNIT		HR	s	PEDAGOGY						
 Introduction: Operating System, History (1990s to 2000 and Beyond), Distributed Computing, Parallel Computation. Process Concepts: Definition of Process, Process States - Lifecycle of a Process, Process Management - Process State Transitions, Process Control Block (PCB), Process Operations, Suspend and Resume, Context Switching, Interrupts - Interrupt Processing, Interrupt Classes, Interprocess Communication - Signals, Message Passing. Asynchronous Concurrent Processes: Mutual Exclusion - Critical 								Black Board/PPT		
п	Primitives Exclusion Algorithm Semapho Synchroni	 Peterson's A Problem, n-th n. res: Mutual ization with Sen 	lgorithm, Softwa read Mutual Ex Exclusion w	are Solutions to t acclusion - Lampon with Semaphores	the Mutual rt's Bakery	15	5	Black Board/PPT		
III	Deadlock Necessary Avoidance Deadlock	and Indefinit Conditions fo e and Dijkstra Recovery.	r Deadlock, Dea s Banker's Algo	t: Resource Conc adlock Prevention, orithm, Deadlock	cepts, Four , Deadlock Detection,	15	5	Black Board/PPT		
IV	 IV Job and Processor Scheduling: Scheduling Levels, Scheduling Objectives, Scheduling Criteria, Preemptive vs Non-Preemptive Scheduling, Interval Timer or Interrupting Clock, Priorities, Scheduling Algorithms - FIFO Scheduling, RR Scheduling, Quantum Size, SJF Scheduling, SRT Scheduling, HRN Scheduling, Multilevel Feedback Queues, Fair Share Scheduling. 							Black Board/PPT		
v	Real Managem Contiguou Contiguou	emory Managent, Memory I ent, Memory I is vs Non-Cou is Memory All	Memory Strategies, ingle User ogramming,	15	5	Black Board/PPT				

Variable Partition Multiprogramming, Memory Swapping.	
Virtual Memory Management: Virtual Memory Basic Concepts,	
Multilevel Storage Organization, Block Mapping, Paging Basic	
Concepts, Segmentation, Paging/Segmentation Systems, Demand	
Paging, Page Replacement Strategies.	

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Internal	Cog	K L aval	Section MC(n A Qs	Section B	Section C Either or Choice				
Internal	COS	K Levei	No. of. Questions	K - Level	Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)				
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)				
		No. of Questions to be asked	4		4	4				
Quest	tion	No. of Questions to be answered	4		2	2				
CIA I & II		Marks for each question	1		5	8				
		Total Marks for each section	4		10	16				

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	I
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2			2	3.6	7 2
	K2	2			2	3.6	1.4
СТА	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
L	Marks	4	20	32	56	100	100
	K1	2			2	3.6	7.2
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
II	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

- K2- Basic understanding of facts and stating main ideas with general answers
- **K3** Application oriented- Solving Problems
- K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or					
S. No	COs	K - Level	No. of		Choice) With	Choice) With					
			Questions	K – Level	K - LEVEL	K - LEVEL					
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
No. of Q	uestions to	be Asked	10		10	10					
No. of Questions to be answered		be answered	10		5	5					
Marks for each question		1		5	8						
Total Marks for each section		10		25	40						

(Figures in parenthesis denotes, questions should be asked with the given K level)

Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5			5	3.57	3.57				
K2	5			5	3.57	3.57				
K3		50		50	35.72	35.72				
K4			80	80	57.14	57.14				
Marks	10	50	80	140	100	100				

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative	Examinations	- (Question	Pa	per –	For	mat
			C				

Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P A	ART – A	(10 x 1 = 10)	Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
-				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the que	estions	PART –	B (5 x 5 = 25 Marks)							
11. a)	Unit - I	CO1	K3								
	OR										
11. b)	Unit - I	CO1	K3								
12. a)	Unit - II	CO2	K3								
OR											
12. b)	Unit - II	CO2	K3								
13. a)	Unit - III	CO3	K3								
				OR							
13. b)	Unit - III	CO3	K3								
14. a)	Unit - IV	CO4	K3								
				OR							
14. b)	Unit - IV	CO4	K3								
15. a)	Unit - V	CO5	K3								
				OR							
15. b)	Unit - V	CO5	K3								

Answer A	LL the quest	ions	PART – C	C $(5 \times 8 = 40 \text{ Marks})$						
16. a)	Unit - I	CO1	K4							
				OR						
16. b)	Unit - I	CO1	K4							
17. a)	Unit - II	CO2	K4							
OR										
17. b)	Unit - II	CO2	K4							
18. a)	Unit - III	CO3	K4							
				OR						
18. b)	Unit - III	CO3	K4							
19. a)	Unit - IV	CO4	K4							
				OR						
19. b)	Unit - IV	CO4	K4							
20. a)	Unit - V	CO5	K4							
	· · · · · ·			OR						
20. b)	Unit - V	CO5	K4							

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name ASP.Net Programming								
Course Cod	e 23UCACC52	L	Р	С				
Category	Core	5	-	4				
COURSE OF	JECTIVES:							
> To wi	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.							
> To	> To develop ASP.NET Web application using standard controls.							
> To	implement file handling operations.							

- > To handle SQL Server Database using ADO.NET.
- > Understand the Grid View control and XML classes.

UNIT - I Overview of .NET Framework

Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library - C# Fundamentals: Primitive types and Variables – Operators – Conditional statements – Looping statements – Creating and using Objects – Arrays – String operations.

UNIT - II Introduction to ASP.NET

Introduction to ASP.NET - IDE - Languages supported Components - Working with Web Forms – Web form standard controls: Properties and its events – HTML controls - List Controls: Properties and its events.

UNIT - III Rich Controls

Rich Controls: Properties and its events – validation controls: Properties and its events – File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.

UNIT - IV ADO.NET Overview

ADO.NET Overview – Database Connections – Commands – Data Reader – Data Adapter – Data Sets – Data Controls and its Properties – Data Binding.

UNIT - V Grid View Control

Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files – Website Security – Authentication – Authorization – Creating a Web application.

Total Lecture Hours75

15

15

15

15

BOOKS FOR STUDY:

- Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
- Mathew, MacDonald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

BOOKS FOR REFERENCES:

- > Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.
- Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech press, 2013.
- > Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc., 2016.
- > Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill, 2008.
- Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.

WEB RESOURCES:

- https://www.geeksforgeeks.org/introduction-to-net-framework/
- https://www.javatpoint.com/net-framework
- https://www.w3schools.com/asp/default.ASP

Nature of Course	EMPLOYABILITY			~	Sŀ	KILL ORIE	ENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REC	GIONAL	_		NATIONAL			GLOBAL		✓
Changes Made in the Course	Percentage of Change				No Changes Made					New Course		~
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	E OUTC	OMES:							K	LEVEL
After stu	udying this	course, th	e students	will be al	ble to:					
CO1	Develop wo	orking know	ledge of C#	[‡] programm	ing construc	ets and the .	NET Frame	ework.	K	1 to K4
CO2	To develop	a software	to solve real	-world prol	blems using	ASP.NET.			K	1 to K4
CO3	To work on various controls files.									
CO4	To create a web application using Microsoft ADO.NET. K1 to K4									
CO5	To develop web applications using XML. K1 to K4									
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	Μ	М	S	М	L	Μ	М
CO2	L	S	S	Μ	M	М	Μ	S	Μ	М
CO3	S	M	S	Μ	Μ	L	S	Μ	Μ	Μ
CO4	М	S	Μ	L	M	S	Μ	Μ	Μ	M
CO 5	S	M	S	Μ	M	М	Μ	S	Μ	L
\$	S- STRON	IG]	M – MED	IUM			L - LO	V

Academic Council Meeting Held On 17.04.2025

CO / I	PO MAPP	ING:					
C	os	PSO1	PSO2	PSO3	PSO4		PSO5
С	01	3	1	2	2		1
С	0 2	3	2	2	2		2
С	03	3	3	2	2		3
С	04	3	1	2	2		1
С	05	3	1	2	2		1
WEIG	HTAGE	15	8	10	10		8
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS		100	53	67	67		53
LESSC	ON PLAN:						
UNIT		AS	P.NET Program	nming		HRS	PEDAGOGY
I	Overview Framewor Variables Creating a	y of .NET fram k Class Librar – Operators – (ond using Object	nework: Commo ry - C# Fundan Conditional stater ts – Arrays – Strip	n Language Runti nentals: Primitive nents – Looping st ng operations.	me (CLR), types and tatements –	15	Black Board/PPT
II	Introduct Working v its events	tion to ASP.NE with Web Forms – HTML contro	T - IDE - Langu s – Web form sta ils - List Controls	ages supported Co ndard controls: Pro : Properties and its	mponents - operties and events.	15	Black Board/PPT
III	Rich Co Properties – Reading Deleting f	ntrols: Proper and its events - g and Writing ïles – File uploa	n controls: - File Share opying and	15	Black Board/PPT		
IV	ADO.NE' Reader – I Data Bind	Γ Overview – Data Adapter – ling.	Database Conne Data Sets – Data	ections – Comman Controls and its F	nds – Data Properties –	15	Black Board/PPT
v	Grid View – Web Authentic	w control: Dele form to mani ation – Authoriz	ting, editing, Sor pulate XML fi zation – Creating	ting and Paging. X les – Website a Web application.	ML classes Security –	15	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Internal	Cos	K L ovol	Section MC(n A Qs	Section B	Section C Either or Choice				
Internal	0.05	K Levei	No. of. Questions	K - Level	Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)				
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)				
		No. of Questions to be asked	4		4	4				
Quest	tion	No. of Questions to be answered	4		2	2				
CIA I & II		Marks for each question	1		5	8				
		Total Marks for each section	4		10	16				

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	Ι
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2			2	3.6	7.2
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
I	K4			32	32	57.1	57.1
1	Marks	4	20	32	56	100	100
	K1	2			2	3.6	7.2
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
II	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summat	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of Questions	K – Level	Choice) With K - LEVEL	Choice) With K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to	be answered	10		5	5				
Marks for each question			1		5	8				
Total Marks for each section			10		25	40				
	(Fig	ires in paren	thesis denotes.	questions show	uld be asked with the give	en K level)				

	Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	5			5	3.57	3.57						
K2	5			5	3.57	3.57						
K3		50		50	35.72	35.72						
K4			80	80	57.14	57.14						
Marks	10	50	80	140	100	100						
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.												

Summative	Examinations -	Question	Paper –	Format
		Y		

Q. No.	Unit	СО	K-level		
Answer A	ALL the que	stions I	PART – A	(10 x 1 = 10 Marks)	
	Unit - I	CO1	K1		
1.				a) b)	
				c) d)	
	Unit - I	CO1	K2		
2.				a) b)	
				c) d)	
	Unit - II	CO2	K1		
3.				a) b)	
				c) d)	
	Unit - II	CO2	K2		
4.				a) b)	
				c) d)	
	Unit - III	CO3	K1		
5.				a) b)	
-				c) d)	
	Unit - III	CO3	K2		
6.				a) b)	
				c) d)	
	Unit - IV	CO4	K1		
7.				a) b)	
				c) d)	
	Unit - IV	CO4	K2		
8.				a) b)	
				c) d)	
	Unit - V	CO5	K1		
9.				a) b)	
				c) d)	
	Unit - V	CO5	K2		
10.				a) b)	
				c) d)	

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)							
11. a)	Unit - I	CO1	K3								
	OR										
11. b)	Unit - I	CO1	K3								
12. a)	Unit - II	CO2	K3								
				OR							
12. b)	Unit - II	CO2	K3								
13. a)	Unit - III	CO3	K3								
				OR							
13. b)	Unit - III	CO3	K3								
14. a)	Unit - IV	CO4	K3								
				OR							
14. b)	Unit - IV	CO4	K3								
15. a)	Unit - V	CO5	K3								
			·	OR							
15. b)	Unit - V	CO5	K3								

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ASP.NET Programming Lab									
Course Code	23UCACP51 L	Р	С							
Category	Core Lab -	5	4							
COURSE OBJE	CTIVES:									
To develop	ASP.NET Web application using standard controls.									
To create ri	ch database applications using ADO.NET.									
To implem	To implement file handling operations.									
To implement XML classes.										
To utilize ASP.NET security features for authenticating the website.										
S. No.Lab Exercise75										
1. Create an exposure of Web applications and tools.										
2. Implement	2. Implement the HTML Controls.									
3. Implement	the Server Controls.									
4. Web applic	ation using Web controls.									
5. Web applic	ation using List controls.									
6. Web page of	lesign using Rich control. Validate user input using Validation controls. We	orking	with							
File concep	ts.									
7. Web applic	ation using Data Controls.									
8. Data bindir	g with Web controls.									
9. Data bindir	ig with Data Controls.									
10. Database a	oplication to perform insert, update, and delete operations.									
operations.	 Database application using Data Controls to perform insert, delete, edit, paging, and sorting operations. 									
12. Implement	12. Implement the XML classes.									
13. Implement	13. Implement Authentication – Authorization.									
14. Ticket rese	14. Ticket reservation using ASP.NET controls.									
15. Online exam	mination using ASP.NET controls.									
	Total Lecture Hour	3	75							

BOOKS FOR STUDY:

- Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
- Mathew, MacDonald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

BOOKS FOR REFERENCES:

- > Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.
- Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 BlackBook, Dreamtech press, 2013.
- Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc., 2016.
- > Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill, 2008.
- Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.

WEB RESOURCES:

- https://www.geeksforgeeks.org/introduction-to-net-framework/
- https://www.javatpoint.com/net-framework
- https://www.w3schools.com/asp/default.ASP

Nature of Course	EMPLOYABILITY			\checkmark	Sk	KILL ORIE	ENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REC	GIONAL	_		NATION	AL	. GLOBAL			,
Changes Made in the Course	Percentage of Change			No Changes Made				New Course	~	1		
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	E OUTC	OMES:							K	LEVEL	
After stu	udying this	course, th	e students	will be al	ole to:						
CO1	To create w	eb applicati	ons and imp	olement var	ious control	S.			K	1 to K4	
CO2	Create a we	eb page in R	ich control.						K	1 to K4	
CO3	Develop knowledge about file handling operations.										
CO4	An ability to design XML classes.										
CO5	5 To develop a software to solve real-world problems using ASP.NET.										
MAPPI	NG WITH	PROGR	AM OUT	COMES:							
CO/PC	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	
CO1	S	S	Μ	М	L	S	М	Μ	Μ	М	
CO2	М	М	S	M	М	M	Μ	S	L	M	
CO3	S	М	Μ	S	М	М	L	S	Μ	М	
CO4	M	S	L	М	М	S	S	Μ	Μ	М	
CO5	S	М	S	М	S	L	Μ	S	Μ	М	
5	S- STRON	IG]	M – MED	IUM			L - LO	N	

Academic Council Meeting Held On 17.04.2025

CO / I	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	ı		PSO5
С	01	3	2	2	2			2
С	0 2	3	2	3	2			2
С	03	3	3	2	2			2
С	04	3	2	3	2			1
С	05	3	2	2	2			2
WEIG	VEIGHTAGE 15 11 12 10							9
WEIC PERCI OF C CONTI N T	WEIGHTED PERCENTAGE OF COURSE100738067CONTRIBUTIO N TO POS738067						60	
LESSC	ON PLAN:							
UNIT		ASP.	NET Programn	ning Lab		HR	s	PEDAGOGY
1	Create an	exposure of We	b applications an	d tools.				
2	Implemen	t the HTML Co	ntrols.					
3	Implemen	t the Server Cor	ntrols.					
4	Web appli	ication using We	eb controls.					
5	Web appli	ication using Lis	st controls.					
6	Web page Validation	e design using R n controls. Work	ich control. Valid	late user input usin ncepts.	g			
7	Web appli	ication using Da	ta Controls.					Domonstrati
8	Data bind	ing with Web co	ontrols.			7	5	on Hands-on
9	Data bind	ing with Data C	ontrols.					Training
10	Database	application to pe	erform insert, upo	late, and delete ope	erations.			
11	Database paging, ar	application usin d sorting operat	elete, edit,					
12	Implemen	t the XML class	ses.					
13	Implemen	t Authenticatior	n – Authorization	•				
14	Ticket res	ervation using A	SP.NET control	s.				
15	Online ex	amination using	ASP.NET contro	ols.				

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)											
Intern al	Cos	K Level	Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding & Implementation	Debuggin g & Output				
	CO1	K1	5								
CI	CO2	K2		5							
AI	CO3	K3			5						
	CO4	К3				5					
	CO5	K4					5				
	JL	No. of Questions to be asked	2	2	2	2	2				
Ques	tion	No. of Questions to be answered	2	2	2	2	2				
CL	A	Marks for each question	2.5	2.5	2.5	2.5	2.5				
		Total Marks for each section	5	5	5	5	5				

		Distri	bution of	Marks with	n K Leve	el CIA			
	K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	Debuggi ng & Output	Total Marks	% of (Mar ks witho ut choic e)	Cons olida ted %
	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
CIA	K4					5	5	20	20
	Marks						25	100	100

- K1- Remembering and recalling facts with specific answers
- **K2** Basic understanding of facts and stating main ideas with general answers
- **K3** Application oriented- Solving Problems
- **K4** Examining, analyzing, presentation and make inferences with evidences

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)											
S.No.	Cos	K Level	Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding& Implementation	Debuggin g & Output					
1	CO1	K1	15									
2	CO2	K2		15								
3	CO3	K3			15							
4	CO4	К3				15						
5	CO5	K4					15					
		No. of Questions to be asked	2	2	2	2	2					
Question Pattern		No. of Questions to be answered	2	2	2	2	2					
		Marks for each question	7.5	7.5	7.5	7.5	7.5					
		Total Marks for each section	15	15	15	15	15					

		Distributi	ion of Mark	s with K	Level			
K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	% of (Marks without choice)	Consol idated %		
K1	15					15	20	20
K2		15				15	20	20
K3			15	15		30	40	40
K4					15	15	20	20
Marks	15	15	15	15	15	75	100	100

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Project with Viva - Voce			
Course Code	23UCAPR51	L	Р	С
Category	Core	-	5	4

COURSE OBJECTIVES:

- > Gain exposure to the various phases of the Software Development Life Cycle.
- Learn to apply skills and knowledge in design, coding, and testing using appropriate technological tools and procedures.
- > Develop applications while adhering to personal, societal, and professional ethical standards.

REGULATIONS

- 1. The Candidates have to undergo Project Work during the Course of Study in the Institution itself.
- 2. Candidates must identify and analyze real-world problems within their selected project domain.
- 3. During the course of study, candidates are required to develop, design, and test applications as per the guidance of their assigned mentor.
- 4. Candidates must prepare and submit a project manuscript as a report, following the requirements set by the institution/department for evaluation.
- 5. The project report must be submitted at the end of the semester for presentation and Viva-Voce as part of the practical examinations.
- 6. The minimum passing requirement for the project work is 40%.
- 7. If a candidate fails to secure 40% in the project work, they must improve and resubmit it in the next attempt.
- 8. A faculty member from the department will act as a guide to supervise and monitor the candidates' progress throughout the project work.
- 9. The assigned faculty member will also serve as the internal examiner during the project work and the Viva-Voce examination.
- 10. Internal marks for the project work will be awarded by the assigned guide/internal examiner.
- 11. Both internal and external examiners will evaluate the project report, assess the presentation, and conduct the Viva-Voce examination.

Total Lecture Hours 75

INTERNAL MARKS AWARDED FOR THE PROJECT WORK – 25 Marks

- 1. Plan of the Project **5 Marks**
- 2. Execution of the Plan –5 Marks
- 3. Individual Initiative 5 Marks
- 4. Review 1 5 Marks
- 5. Review 2 5 Marks

EXTERNAL MARKS AWARDED FOR THE PROJECT WORK – 75 Marks

- 1. Evaluation of the Project Report 25 Marks
- 2. Presentation **25 Marks**
- 3. Viva-Voce Examination 25 Marks

Total – 100 Marks

Nature of Course	EMPLOYABILITY			✓	SK	SKILL ORIENTED			ENTRE	TIP	
Curriculum Relevance	LOCAL REG			IONAL	_		NATION	AL	\checkmark	GLOBAL	
Changes Made in the Course	Percentage of Change		ange	80%	ſ	No Changes Made New Course					
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURS	SE OUTC	OMES:							K	LEVEL
After s	tudying	this cou	rse, the	students	s will be	able to:				
CO1	Show Lead	dership Ski	lls and Le	arn Time N	lanagemen	t			K	1 to K4
CO2	Identify va	arious Tool	s to be app	olied to a sp	pecific Prob	olem			K	1 to K4
CO3	Evaluate the Reports									1 to K4
CO4	Involve in	the Team a	and Manag	ge it to deliv	ver the exc	ellent Ou	itcomes		K	1 to K4
CO5	Assess and	l Develop t	he Individ	ual Skills t	o Present a	nd Organ	nize the Proj	ects	K	1 to K4
MAPPI	NG WITH PROGRAM OUTCOMES:									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	Μ	S	S	S	M	Μ	S	Μ
CO2	S	S	S	S	S	S	S	Μ	S	S
CO3	S	S	S	S	S	S	S	Μ	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S
	S- STRON	IG			M – MED	IUM			L - LO	N
CO / F	PO MAPPING:									
C	os	PSO	1	PSO2	PSC	03	PSO4	PSC)5	PSO6
C	01	3		2	3		3	3		3

C02	3	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	3	3	3	3
C05	3	3	3	3	2	3
WEIGHTAGE	15	13	15	15	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS	100%	87%	93%	100%	93%	93%

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Big Data Analytics			
Course Code	23UCAEC51	L	Р	С
Category	Elective	4	-	3
COURSE OBJE	CTIVES:			

- Understand the Big Data Platform and its Use cases
- > To identify and understand the basics of cluster and decision tree
- > To study about the Association Rules, Recommendation System
- > To learn about the concept of streaming
- Understand the concepts of NoSQL Databases

UNIT - I INTRODUCTION

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating —The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications —Perception and Quantification of Value –Understanding Big Data Storage —A General Overview of High-Performance Architecture—HDFS—Map Reduce And YARN—Map Reduce Programming Model

UNIT - II ADVANCED ANALYTICAL THEORY AND METHODS, 12 HRS CLASSIFICATION-

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method—Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .Classification: Decision Trees—Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms—Evaluating a Decision Tree—Decision Trees in R — Naïve Bayes — Bayes Theorem—Naïve Bayes Classifier.

UNIT - III ADVANCED ANALYTICAL THEORY AND METHODS, RECOMMENDATION SYSTEM

Advanced Analytical Theory and Methods: Association Rules—Overview— Apriori Algorithm— Evaluation of Candidate Rules—Applications of Association Rule Finding Association & finding similarity — **Recommendation System:** Collaborative Recommendation- Content Based Recommendation —Knowledge Based Recommendation-Hybrid Recommendation Approaches.

UNIT - IV STREAM CONCEPTS

Introduction to Streams Concepts—Stream Data Model and Architecture—Stream Computing, Sampling Data in a Stream — Filtering Streams —Counting Distinct Elements in a Stream — Estimating moments—Counting ones in a Window—Decaying Window—Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics- give spaces between words

UNIT - V NOSQL DATABASES

NoSQL Databases: Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores-Document Stores — Tabular Stores — Object Data Stores—Graph Databases Hive—Sharding—HBase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.

Total Lecture Hours

12 HRS

12HRS

12 HRS

12 HRS

BOOKS FOR STUDY:

Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

BOOKS FOR REFERENCES:

- David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/Elsevier Publishers, 2013.
- EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley Publishers, 2015.

WEB RESOURCES:

- https://www.tutorialspoint.com/big_data_analytics/index.htm
- https://www.sas.com/en_us/insights/analytics/big-data-analytics.html
- https://www.tutorialspoint.com/big_data_analytics/index.htm

Nature of Course	EMPLOYABILITY			✓	SK	KILL ORIE	ENTED		ENTREPRENEURSHIP		P	
Curriculum Relevance	LOCAL		REC	IONAL	_		NATION	AL	GLOBAL			✓
Changes Made in the Course	Percentag	e of Ch	lange	60%		No Chang	ges Made		New Course			
* Treat	* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURS	E OUTCO	OMES:							K	LEVEL		
After stu	udying this	course, th	e students	will be at	ole to:							
CO1	Work with	big data tool	ls and its an	alysis techn	niques.				K	1 to K4		
CO2	Analyze da	K	1 to K4									
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.											
CO4	Perform analytics on data streams. K1											
CO5	5 Learn NoSQL databases and management. K:											
MAPPI	NG WITH	PROGR	AM OUT	COMES:								
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	Μ	M	M	M	L	M	Μ	Μ	М		
CO2	S	S	M	L	Μ	M	M	Μ	Μ	М		
CO3	O3 M M M S M S L M M											
CO4	D4 M M L S S M M M											
CO5	M M S M M M L S M M											
\$	S- STRON	IG]	M – MED	IUM			L - LO	N		

CO / I	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	ŀ		PSO5
С	01	1	3	2	2			3
С	02	3	2	3	2			3
С	03	1	3	2	2			2
C	CO 4 3 3 3 1							3
C	CO 5 3 2 3 3							3
WEIG	HTAGE	11	13	13	10			14
WEIC PERCI OF C CONTI N TC	GHTED ENTAGE OURSE RIBUTIO O POS	73	87	87	67			93
LESSC	ON PLAN:							
UNIT		В	ig Data Analy	tics		HI	RS	PEDAGOGY
I	Evolutio Big data of Big I Applicati Understa Performa Reduce F	n of Big data characteristics Data — Big Da ons —Percep nding Big Data nce Architectur Programming M	— Best Practice — Validating — ata Use Cases- ation and Qua a Storage —A (re—HDFS—Map odel	s for Big data An The Promotion of Characteristics of antification of General Overview Reduce And YA	alytics — the Value Big Data Value – of High- RN—Map	12	HRS	Black Board/PPT
II	Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method— Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .Classification: Decision Trees—Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms—Evaluating a Decision Tree—Decision Trees in R —							Black Board/PPT
III	Advanced Analytical Theory and Methods: Association Rules— Overview— Apriori Algorithm—Evaluation of Candidate Rules— Applications of Association Rule Finding Association & finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation —Knowledge Based Recommendation-Hybrid Recommendation Approaches.					12 1	HRS	Black Board/PPT
IV	Based Recommendation-Hybrid Recommendation Approaches. Introduction to Streams Concepts—Stream Data Model and Architecture—Stream Computing, Sampling Data in a Stream — Filtering Streams —Counting Distinct Elements in a Stream — Estimating moments—Counting on enessina Window—Decaying Window—Real time Analytics Platform(RTAP) applications — Case						HRS	Black Board/PPT

	Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics- give spaces between words		
v	NoSQL Databases : Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores-Document Stores — Tabular Stores — Object Data Stores—Graph Databases Hive—Sharding— HBase — Analyzing big data with twitter — Big data for E- Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.	12 HRS	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Intornal	Cas	K L ovol	Section MC(n A Qs	Section B	Section C					
Internal Cos		K Levei	No. of. Questions	K - Level	Choice	Either or Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AI CO2		K1 – K4	2	K1,K2	2(K3)	2(K4)					
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)					
		No. of Questions to be asked	4		4	4					
Question Pattern CIA I & II		No. of Questions to be answered	4		2	2					
		Marks for each question	1		5	8					
		Total Marks for each section	4		10	16					

	Distribution of Marks with K Level CIA I & CIA II											
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2			2	3.6	7 2					
	K2	2			2	3.6	1.4					
СТА	K3		20		20	35.7	35.7					
	K4			32	32	57.1	57.1					
1	Marks	4	20	32	56	100	100					
	K1	2			2	3.6	7.2					
	K2	2			2	3.6	1.2					
CIA	K3		20		20	35.7	35.7					
II	K4			32	32	57.1	57.1					
	Marks	4	20	32	56	100	100					

- K1- Remembering and recalling facts with specific answers
- K2- Basic understanding of facts and stating main ideas with general answers
- K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of	K Lovol	Choice) With	Choice) With				
			Questions	K – Level	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Questions to be Asked		be Asked	10		10	10				
No. of Questions to be answered		10		5	5					
Marks for each question			1		5	8				
Total Marks for each section			10		25	40				
	(Figures in parenthesis denotes, questions should be asked with the given K level)									

Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5			5	3.57	3.57			
K2	5			5	3.57	3.57			
K3		50		50	35.72	35.72			
K4			80	80	57.14	57.14			
Marks	10	50	80	140	100	100			
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

Q. No.	Unit	CO	K-level		
Answer ALL the questions		stions	PART – A	(10 x 1 = 10 Marks)	
	Unit - I	CO1	K1		
1.				a) b)	
				c) d)	
	Unit - I	CO1	K2		
2.				a) b)	
				c) d)	
	Unit - II	CO2	K1		
3.				a) b)	
				c) d)	
	Unit - II	CO2	K2		
4.				a) b)	
				c) d)	
5.	Unit - III	CO3	K1		
				a) b)	
				c) d)	
	Unit - III	CO3	K2		
6.				a) b)	
				c) d)	
	Unit - IV	CO4	K1		
7.				a) b)	
				c) d)	
	Unit - IV	CO4	K2		
8.				a) b)	
				c) d)	
	Unit - V	CO5	K1		
9.				a) b)	
				c) d)	
	Unit - V	CO5	K2		
10.				a) b)	
				c) d)	

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
				OR						
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the ques	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
			· · ·	OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Software Project Management			
Course Code	23UCAEC52	L	Р	С
Category	Elective	4	-	3
COUDED OD ID				

COURSE OBJECTIVES:

- > To define and highlight the importance of software project management.
- > To formulate and define the software management metrics & strategy in managing projects.
- > Understand and apply software testing techniques in a commercial environment.

UNIT - I INTRODUCTION TO COMPETENCIES

Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and Models - The SEI CMM - International Organization for Standardization.

UNIT - II MANAGING DOMAIN PROCESSES

Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project - Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.

UNIT - III TASKS AND ACTIVITIES

Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.

UNIT - IV PROJECT MANAGEMENT RESOURCE

Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.

UNIT - V QUALITY

Quality: Requirements – The SEI CMM – Guidelines – Challenges – Quality Function Deployment – Building the Software Quality Assurance Plan – Software Configuration Management: Principles – Requirements – Planning and Organizing – Tools – Benefits – Legal Issues in Software – Case Study.

Total Lecture Hours60 HRS

12 HRS

12 HRS

12 HRS

12 HRS

12 HRS

BOOKS FOR STUDY:

Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management", Pearson Education Asia, 2002.

BOOKS FOR REFERENCES:

- > Pankaj Jalote, "Software Project Management in Practice", Addison Wesley, 2002.
- Hughes, "Software Project Management", Tata McGraw Hill, 2004, 3rd Edition.

WEB RESOURCES:

- https://onlinecourses.nptel.ac.in/noc19_cs70/preview
- https://www.smartworld.com/notes/software-project-management
- https://www.tutorialspoint.com/software_engineering/software_project_ma nagement.htm

Nature of Course	EMPLC		SKILL ORIENTED				ENTREPRENEURSHIP			✓		
Curriculum Relevance	LOCAL REC			IONAL			NATIONAL			GLOBAL		\checkmark
Changes Made in the Course	Percentag	20%		No Chang	ges Made			New Course				
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	RSE OUTCOMES:											
After st	fter studying this course, the students will be able to:											
CO1	Understand the principles and concepts of project management											
CO2	Knowledge gained to train software project managers											
CO3	Apply software project management methodologies.											
CO4	Able to create comprehensive project plans											
CO5	Evaluate and mitigate risks associated with software development process									K1 to K4		
MAPPI	NG WITH	PROGR	AM OUT	COMES:								
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO 1	S	М	M	М	М	L	М	M	Μ	М		
CO2	S	S	M	М	L	M	М	M	Μ	М		
CO3	M	М	M	S	М	S	М	L	Μ	M		
CO4	M	Μ	L	S	S	S	М	Μ	Μ	M		
CO5	M	M	S	М	М	М	L	S	Μ	M		
;	S- STRONG M – MEDIUM L - LC											
CO / I	PO MAPP	ING:										
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C	os	PSO1	PSO2	PSO3	PSO4		PS	05	PSO6			
C	01	2	2	1	3		3	5	1			
С	0 2	2	1	2	3		3	;	1			
С	03	3	2	1	2		3	}	3			
С	04	2	3	2	3	2		1				
C	0 5	2	2	2	3		3	<u> </u>	3			
WEIG	HTAGE	- 11	9	8	14		14	1	9			
WEIG PERCI OF C CONTI N TO	GHTED ENTAGE OURSE RIBUTIO O POS	73	60	53	93		9	60				
LESSC	ON PLAN:											
UNIT		Softwa		HI	RS	PEI	DAGOGY					
I	Introduct Managem Developm Organizat	echniques - - Software nternational	12 I		E BC	BLACK DARD / LCD						
п	Managing Portfolio I - Goal and the Work Project M	g Domain Pro Management - H d Scope of the S Breakdown St ilestones - Work	cesses - Project Financial Process Software Project ructure - Appro c Packages - Buil	Selection Models es - Selecting a Project Planning aches to Building ding a WBS for So	s - Project oject Team - Creating a WBS - ftware.	1	2	E B(BLACK DARD / LCD			
III	Tasks and CMM - I COCOMO Mathemat Skills Nee	- The SEI Measures - SLIM: A Roles and	1	2	E B(BLACK DARD / LCD						
IV	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling						2	E B(3LACK DARD / LCD			
v	Quality: Quality I Assurance Requirement Issues in S	Requirements – Function Deplo Plan – Softwa ents – Planning Software – Case	The SEI CMM oyment – Build are Configuratio and Organizing Study.	– Guidelines – Cl ding the Softwar n Management: P g – Tools – Benef	nallenges – re Quality rinciples – its – Legal	1	2	E BC	BLACK DARD / LCD			

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Intonnol	Cos	K L ovol	Section MC(n A Qs	Section B	Section C Either or Choice				
Internar	Cos	K Levei	No. of. Questions	K - Level	Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)				
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)				
		No. of Questions to be asked	4		4	4				
Quest	tion	No. of Questions to be answered	4		2	2				
CIA I & II		Marks for each question	1		5	8				
		Total Marks for each section	4		10	16				

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	I
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2			2	3.6	7 3
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
1	Marks	4	20	32	56	100	100
	K1	2			2	3.6	7 3
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
II	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

- K1- Remembering and recalling facts with specific answers
- **K2-** Basic understanding of facts and stating main ideas with general answers
- **K3** Application oriented- Solving Problems
- K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summati	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
		K - Level	Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs		No. of Questions	K – Level	Choice) With K - LEVEL	Choice) With K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to	be answered	10		5	5				
Marks for each question			1		5	8				
Total Marks for each section			10		25	40				
	(Fig	ires in parent	thesis denotes.	questions show	uld be asked with the give	en K level)				

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5			5	3.57	3.57					
K2	5			5	3.57	3.57					
K3		50		50	35.72	35.72					
K4			80	80	57.14	57.14					
Marks	10	50	80	140	100	100					
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.											

Q. No.	Unit	СО	K-level		
Answer A	LL the quest	ions P A	ART – A	(10 x 1 = 1)	0 Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
				OR						
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
	·			OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Computational Intelligence								
Course Code	23UCAEC53	L	Р	С					
Category	Elective	4	-	3					
COURSE OBJE	COURSE OBJECTIVES:								

- > To identify and understand the basics of AI and its search.
- > To study about the Fuzzy logic systems.
- > Understand and apply the concepts of Neural Network and its functions.
- > Understand the concepts of Artificial Neural Network.
- > To study about the Genetic Algorithm.

UNIT - I Introduction to AI: Problem formulation

Introduction to AI: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.

UNIT - II Fuzzy Logic Systems

Fuzzy Logic Systems: Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule-Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – Fuzzy Rule-Based Classifier.

UNIT - III Neural Networks

Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory. Adaptive Resonance theory and Self Organizing Map, Recent Applications.

UNIT - IV Artificial Neural Networks

Artificial Neural Networks: Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.

UNIT - V Genetic Algorithm

Genetic Algorithm: Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm.

Total Lecture Hours 60

12

12

12

. 12

BOOKS FOR STUDY:

- S.N. Sivanandam and S.N. Deepa, —Principles of Soft Computing, 2nd Edition, Wiley India Pvt. Ltd.
- Stuart Russell and Peter Norvig, —Artificial Intelligence A Modern Approachl, 2nd Edition, Pearson Education in Asia.
- S. Rajasekaran, G.A. Vijayalakshmi, —Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis & Applications, PHI.

BOOKS FOR REFERENCES:

- F. Martin McNeill and Ellen Thro, —Fuzzy Logic: A Practical Approach^I, AP Professional, 2000.
- Chin-Teng Lin, C.S. George Lee, —Neuro-Fuzzy Systems, PHI.

WEB RESOURCES:

- https://www.javatpoint.com/artificial-intelligence-tutorial
- https://www.w3schools.com/ai/
- https://github.com/Computational-Intelligence-Fall18/Computational-Intelligence-Tutorials

Course	EMPLO	YABII	JTY		SKILL ORIENTED			ENTRE	✓		
Curriculum Relevance	LOCAL		REG	IONAL		NATION	AL		GLOBAL		
Changes Made in the Course	Percentage	e of Ch	ange		No Chan	ges Made			New Course		

* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.

COURS	SE OUTC	OMES:								K LEVEL	
After st	After studying this course, the students will be able to:										
CO1	Describe the	he fundame	entals of ar	tificial inte	elligence co	oncepts and	d searching	g technique	es.	K1 to K4	
CO2	Develop the fuzzy logic sets and membership function and defuzzification techniques. K1 to K4										
CO3	Understand the concepts of Neural Network and analyze and apply the learning techniques. K1 to K4										
CO4	Understand the artificial neural networks and its applications. K1 to K4										
CO5	Understand the concept of Genetic Algorithm and analyze the optimization problems K1 to K4										
MAPPI	NG WITH	PROGR	AM OUT	COMES:							
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	9 PO10	
CO1	S	М	Μ	Μ	Μ	L	Μ	Μ	Μ	М	
CO2	S	S	L	Μ	Μ	Μ	Μ	Μ	Μ	Μ	
CO3	Μ	М	Μ	S	L	S	Μ	Μ	M	Μ	
CO4	L	М	Μ	S	S	S	Μ	Μ	M	Μ	
CO5	Μ	М	S	L	Μ	Μ	Μ	S	Μ	Μ	

	S- STROI	NG]			L - L	ow		
CO / I	PO MAPP	ING:							
C	os	PSO1	PSO2	PSO3	PSO4	·	PSO 5	PSO6	
С	01	2	3	2	2		-	1	
С	0 2	3	2	3	2		3	3	
С	03	3	1	2	2		2	3	
С	04	2	3	-	1		3	-	
С	05	3	2	3	3		3	3	
WEIG	HTAGE	13	11	10	10	11		10	
WEIC PERCI OF C CONTI N TO	GHTED ENTAGE OURSE RIBUTIO O POS	87	73	67	67		67		
LESSC	ON PLAN:								
UNIT		Comp		HRS	PE	DAGOGY			
I	Introduct – State Sp Depth Fi techniques Fuzzy Lo – T-norm Reasoning Systems –	 Problems First and stic search fuzzy sets pproximate Rule-Based zification – 	12	Bo	Black bard/PPT Black bard/PPT				
III	Fuzzy Clustering – Fuzzy Rule-Based Classifier Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Backpropagation Learning, Variation of Standard Backpropagation Neural Network, Introduction to Associative Memory. Adaptive Pacepagate theory and Salf Organizing Map Pacept Applications							Black bard/PPT	
IV	Artificial Artificial McCulloc	Artificial Neural Networks:Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.12Black Board/PPT							
v	Genetic A Algorithm Algorithm Genetic A	Algorithm: Intra Vs Traditiona – Simple GA Igorithm.	roduction – Biolo l Algorithm – Ba – General Gene	ogical Background asic Terminologies tic Algorithm – O	- Genetic in Genetic perators in	12	Вс	Black bard/PPT	

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)											
Internal	Cos	K L aval	Section MC(n A Qs	Section B	Section C Either or Choice						
Internal	COS	K Level	No. of. Questions	K - Level	Choice							
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)						
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)						
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)						
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)						
H		No. of Questions to be asked	4		4	4						
Quest	tion	No. of Questions to be answered	4		2	2						
CIA I & II		Marks for each question	1		5	8						
		Total Marks for each section	4		10	16						

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	I
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2			2	3.6	7 2
	K2	2			2	3.6	1.2
СТА	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
L.	Marks	4	20	32	56	100	100
	K1	2			2	3.6	7 2
	K2	2			2	3.6	1.4
CIA	K3		20		20	35.7	35.7
II	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summati	ive Exam	nination – B	lue Print Artic	culation Map	ping – K Level with Co	ourse Outcomes (COs)
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or
S. No	COs	K - Level	No. of Questions	K – Level	Choice) With K - LEVEL	Choice) With K - LEVEL
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)
No. of Q	uestions to	be Asked	10		10	10
No. of Que	No. of Questions to be answered				5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
	(Fig	ires in parent	thesis denotes, o	questions sho	uld be asked with the give	en K level)

		Distrib	ution of Mar	ks with l	K Level					
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5			5	3.57	3.57				
K2	5			5	3.57	3.57				
K3		50		50	35.72	35.72				
K4			80	80	57.14	57.14				
Marks	10	50	80	140	100	100				
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Summative	Examinations	- (Question	Pa	per –	For	mat
			C				

Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P A	ART – A	(10 x 1 = 10)	Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3	
				OR
11. b)	Unit - I	CO1	K3	
12. a)	Unit - II	CO2	K3	
				OR
12. b)	Unit - II	CO2	K3	
13. a)	Unit - III	CO3	K3	
				OR
13. b)	Unit - III	CO3	K3	
14. a)	Unit - IV	CO4	K3	
				OR
14. b)	Unit - IV	CO4	K3	
15. a)	Unit - V	CO5	K3	
				OR
15. b)	Unit - V	CO5	K3	

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Artificial Intelligence								
Course Code	23UCAEC54	L	Р	С					
Category	Elective	4	-	3					
COURSE OBJEC	CTIVES:								
 To learn van To learn van To learn pro To learn abo To learn van 	tious concepts of AI techniques. tious search algorithms in AI. babilistic reasoning and models in AI. but Markov Decision Process. tious types of reinforcement learning								
UNIT - I Intro	duction			12					
Introduction: Concept of AI, History, Current Status, Scope, Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree									
UNIT - II Sear	ch Algorithms			12					
Search Algorithm Search, Heuristic S	s: Random Search, Search with Closed and Open List, Depth-Firse earch, Best-First Search, A*Algorithm, Game Search	st and	Breadt	h-First					
UNIT - III Prob	abilistic Reasoning			12					
Probabilistic Rea representation, cons	soning: probability, conditional probability, Bayes' rule, Baystruction, and inference, temporal models, hidden Markov model	yesian	netwo	orks -					
UNIT - IV Mark	ov Decision Process (MDP)			12					
Markov Decision Policy Iteration, and	Process (MDP): MDP Formulation, Utility Theory, Utility Function d Partially Observable MDPs	ons, V	alue Ite	ration,					
UNIT - V Rein	forcement Learning			12					
Reinforcement Le Programming, Tem	Reinforcement Learning: Passive Reinforcement Learning, Direct Utility Estimation, Adaptive Dynamic Programming, Temporal Difference Learning, Active Reinforcement Learning								
	Total Lecture	Hour	S	60					
L									

BOOKS FOR STUDY:

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall.
- Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill.

BOOKS FOR REFERENCES:

- > Trivedi, M. C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.
- Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011.
- David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press, 2010.

WEB RESOURCES:

- https://nptel.ac.in/courses/106106140/
- https://nptel.ac.in/courses/106106126/
- https://www.geeksforgeeks.org/artificial-intelligence/

Nature of Course	EMPLOYABILITY			✓	SKILL ORIENTED				ENTRE	P		
Curriculum Relevance	LOCAL	LOCAL REGIO					NATION	AL	GLOBAL			\checkmark
Changes Made in the Course	Percentag	80%		No Chang	ges Made			New Course				
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	SE OUTC	OMES:							K	LEVEL			
After st	udying this	course, th	e students	s will be a	ble to:								
CO1	Understan	d the vario	us concept	s of AI tec	hniques				K	1 to K4			
CO2	Understan	d various S	earch Algo	orithms in	AI.				K	K1 to K4			
CO3	Understan	d probabili	stic reason	ing and mo	odels in AI				K	K1 to K4			
CO4	Understan	K	K1 to K4										
CO5	Understand various types of Reinforcement learning techniques.												
MAPPI	NG WITH	PROGR	AM OUT	COMES:									
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	М	Μ	Μ	Μ	Μ	Μ	L	Μ	Μ			
CO2	S	S	Μ	Μ	Μ	Μ	L	Μ	Μ	Μ			
CO3	L	М	Μ	S	Μ	S	Μ	Μ	Μ	Μ			
CO4	Μ	L	Μ	S	S	S	Μ	Μ	Μ	Μ			
CO 5	Μ	М	S	Μ	L	Μ	Μ	S	Μ	M			
	S. STROM	STRONG M – MEDIUM L - Lo											

CO / PO MAPPI	NG:				
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	2	3	2	3	2
CO 2	2	2	2	3	3
CO 3	1	2	1	1	2
CO 4	3	1	2	2	2
CO 5	2	1	3	1	2
WEIGHTAGE	10	9	10	10	11
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS	67	60	67	67	73
LESSON PLAN:					

UNIT	Artificial Intelligence	HRS	PEDAGOGY
I	Introduction: Concept of AI, History, Current Status, Scope, Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree	12	Black Board/PPT
п	Search Algorithms: Random Search, Search with Closed and Open List, Depth-First and Breadth-First Search, Heuristic Search, Best-First Search, A*Algorithm, Game Search	12	Black Board/PPT
III	probabilistic reasoning: probability, conditional probability, bayes' rule, Bayesian networks - representation, construction, and inference, temporal models, hidden Markov model	12	Black Board/PPT
IV	Markov Decision Process (MDP): MDP Formulation, Utility Theory, Utility Functions, Value Iteration, Policy Iteration, and Partially Observable MDPs	12	Black Board/PPT
v	Reinforcement Learning: Passive Reinforcement Learning, Direct Utility Estimation, Adaptive Dynamic Programming, Temporal Difference Learning, Active Reinforcement Learning	12	Black Board/PPT

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	n A	Section B					
Internal	Cos	K Level	MCQ)s	Either or	Section C				
			No. of. Questions	K - Level	Choice	Either or Choice				
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)				
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)				
	1	No. of Questions to be asked	4		4	4				
Quest	tion	No. of Questions to be answered	4		2	2				
CIA I	& II	Marks for each question	1		5	8				
		Total Marks for each section	4		10	16				

	Distribution of Marks with K Level CIA I & CIA II											
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2			2	3.6	7.2					
	K2	2			2	3.6	1.4					
СІА	K3		20		20	35.7	35.7					
	K4			32	32	57.1	57.1					
1	Marks	4	20	32	56	100	100					
	K1	2			2	3.6	7.2					
	K2	2			2	3.6	1.4					
CIA	K3		20		20	35.7	35.7					
II	K4			32	32	57.1	57.1					
	Marks	4	20	32	56	100	100					

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summat	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of Questions	K – Level	Choice) With K - LEVEL	Choice) With K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to	be answered	10		5	5				
Marks	for each o	question	1		5	8				
Total Ma	arks for ea	ch section	10		25	40				
	(Fig	ires in parent	thesis denotes.	questions show	uld be asked with the give	en K level)				

Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5			5	3.57	3.57				
K2	5			5	3.57	3.57				
K3		50		50	35.72	35.72				
K4			80	80	57.14	57.14				
Marks	10	50	80	140	100	100				
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

Q. No.	Unit	CO	K-level		
Answer A	ALL the que	stions I	PART – A	(10 x 1 = 10 N)	Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
5.				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3						
OR									
11. b)	Unit - I	CO1	K3						
12. a)	Unit - II	CO2	K3						
				OR					
12. b)	Unit - II	CO2	K3						
13. a)	Unit - III	CO3	K3						
				OR					
13. b)	Unit - III	CO3	K3						
14. a)	Unit - IV	CO4	K3						
				OR					
14. b)	Unit - IV	CO4	K3						
15. a)	Unit - V	CO5	K3						
				OR					
15. b)	Unit - V	CO5	K3						

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Cloud Computing								
Course Code	Code 23UCAEC55 L P								
Category	Elective 4 -								
 COURSE OBJECTIVES: Learning fundamental concepts and technologies of Cloud Computing. Learning various cloud service types and their uses and pitfalls. To learn about Cloud Architecture and application design. To know the various aspects of application design, benchmarking, and security on the Cloud. To learn the various case studies in Cloud Computing. 									
UNIT – I Intro Tech	duction to Cloud Computing & Cloud Concepts and nologies			12					
Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing									
UNIT - II Clou	d Services			12					

Compute Services: Amazon Elastic Compute Cloud - Google Compute Engine - Windows Azure Virtual Machines. **Storage Services**: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage. **Database Services**: Amazon Relational Data Store - Amazon DynamoDB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service. **Application Services**: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services. **Content Delivery Services**: Amazon CloudFront - Windows Azure Content Delivery Network. **Analytics Services**: Amazon Elastic MapReduce - Google MapReduce Service - Google Big Query - Windows Azure HDInsight. **Deployment and Management Services**: Amazon Elastic Beanstalk – Amazon CloudFormation. **Identity and Access Management Services**: Amazon Identity and Access Management - Windows Azure Active Directory. **Open-Source Private Cloud Software**: Cloud Stack - Eucalyptus - OpenStack.

UNIT - III Cloud Application Design

Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).

Nature of

Course	EMPLOYABILITY			SKILL ORIENTED				ENTRE	PRENEURSHI)	~
Curriculum Relevance	LOCAL		REG	IONAL		NATION	AL		GLOBAL		\checkmark
Changes Made in the Course	Percentage of Change			60%	No Chan	ges Made			New Course		
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

UNIT - IV Cloud Application Benchmarking and Tuning& Cloud Security 12

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.

Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.

UNIT - V Case Studies

Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems – Cloud Computing for Transportation Systems – Cloud Computing for Manufacturing Industry – Cloud Computing for Education.

Total Lecture Hours

60

12

BOOKS FOR STUDY:

Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands-On Approach, Universities Press (India) Pvt. Ltd., 2018.

BOOKS FOR REFERENCES:

- Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw-Hill, 2013.
- > Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
- > David Crookes, Cloud Computing in Easy Steps, Tata McGraw Hill, 2015.
- > Dr. Kumar Saurabh, Cloud Computing, Wiley India, Second Edition, 2012.

WEB RESOURCES:

- https://en.wikipedia.org/wiki/Cloud_computing
- https://link.springer.com/chapter/10.1007/978-3-030-34957-8 7
- https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloudcomputing/121838-
- https://statetechmagazine.com/sites/default/files/121838-cdw-cloud-computingreference-guide.pdf

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COURS	SE OUTC	OMES:]	K LEVEL	
After stu	After studying this course, the students will be able to:										
CO1	Understan	d the funda	mental c	oncepts and	technologi	es in Clo	ud Computi	ng.	:	K1 to K4	
CO2	Able to un	derstand va	arious clo	oud service t	ypes and th	eir uses a	and pitfalls.		:	K1 to K4	
CO3	Able to un	derstand C	loud Arc	hitecture and	d Applicati	on design	l .		:	K1 to K4	
CO4	Understan Cloud.	d the vario	us aspect	s of applicat	tion design,	benchma	arking, and s	security i	n the	K1 to K4	
CO5	Understan	d various c	ase studio	es in Cloud	Computing					K1 to K4	
MAPPI	ING WITH PROGRAM OUTCOMES:										
CO/PC	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	POS	PO10	
CO1	S	М	M	Μ	Μ	Μ	Μ	L	Μ	Μ	
CO2	S	S	L	Μ	Μ	Μ	M	Μ	Μ	Μ	
CO3	L	М	Μ	S	Μ	S	Μ	Μ	Μ	М	
CO4	Μ	М	M	S	S	S	L	Μ	Μ	Μ	
C05	Μ	М	S	L	Μ	Μ	Μ	S	Μ	М	
	S- STROI	NG			M – MED	IUM			L - L()W	
CO / P	O MAPPI	ING:			1						
COS PSO1			PSO2	PSC)3	PSO4		PSO5			
C	CO 1 2			2	2		3		3		
C	0 2	3		1	2		3			3	
C	D 3	3		2	1		2			1	
C	D 4	3		3	2		3		2	2	
C	05	2		2	1		3		3		
WEIG	HTAGE	13		10	8		14		1	2	
WEIG PERCE OF CO CONTE N TO	HTED ENTAGE DURSE RIBUTIO D POS	87		67	53	8	93		8	0	
LESSO	N PLAN:										
UNIT			Clou	ıd Compu	iting			HRS	PE	DAGOGY	
I	UNITCloud ComputingHRSPEDAGOGYIntroduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level12Black Board/PPT									Black ard/PPT	

Π	Cloud ServicesCompute Services: Amazon Elastic Compute Cloud - Google ComputeEngine - Windows Azure Virtual Machines.Storage Services: Amazon Simple Storage Service - Google CloudStorage - Windows Azure Storage.Database Services: Amazon Relational Data Store - AmazonDynamoDB - Google Cloud SQL - Google Cloud Data Store - WindowsAzure SQL Database - Windows Azure Table Service.Application Services: Application Runtimes and Frameworks -Queuing Services - Email Services - Notification Services - MediaServices.Content Delivery Services: Amazon CloudFront - Windows AzureContent Delivery Services: Amazon Elastic MapReduce - Google MapReduceService - Google Big Query - Windows Azure HDInsight.Deployment and Management Services: Amazon Elastic Beanstalk -Amazon CloudFormation.Identity and Access Management Services: Amazon Identity andAccess Management - Windows Azure Active Directory.Open-Source Private Cloud Software: Cloud Stack - Eucalyptus -OpenStack	12	Black Board/PPT
ш	Cloud Application Design : Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).	12	Black Board/PPT
IV	Cloud Application Benchmarking and Tuning : Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.	12	Black Board/PPT
v	Case Studies : Cloud Computing for Healthcare – Cloud Computing for Energy Systems – Cloud Computing for Transportation Systems – Cloud Computing for Manufacturing Industry – Cloud Computing for Education.	12	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	n A	Section B						
Internal	Cos	K Level	MCQ	Qs	Either or	Section C					
			No. of. Questions	K - Level	Choice	Either or Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)					
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)					
	1	No. of Questions to be asked	4		4	4					
Quest	tion	No. of Questions to be answered	4		2	2					
Pattern CIA I & II		Marks for each question	1		5	8					
		Total Marks for each section	4		10	16					

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	I	
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2 2 3.6		7 3				
	K2	2			2	3.6	1.4	
CIA	K3		20		20	35.7	35.7	
	K4			32	32	57.1	57.1	
I	Marks	4	20	32	56	100	100	
	K1	2			2	3.6		
	K2	2			2	3.6	1.2	
CIA	K3		20		20	35.7	35.7	
II	K4			32	32	57.1	57.1	
	Marks	4	20	32	56	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or					
S. No	COs	K - Level	No. of	K Laval	Choice) With	Choice) With					
			Questions	K – Levei	K - LEVEL	K - LEVEL					
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
No. of Q	uestions to	be Asked	10		10	10					
No. of Que	estions to l	be answered	10		5	5					
Marks for each question			1		5	8					
Total Marks for each section			10		25	40					
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)					

	Distribution of Marks with K Level												
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %							
K1	5			5	3.57	3.57							
K2	5			5	3.57	3.57							
K3		50		50	35.72	35.72							
K4			80	80	57.14	57.14							
Marks	10	50	80	140	100	100							

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative	Examinations -	Question	Paper –	Format
		Y		

Q. No.	Unit	CO	K-level	
Answer A	ALL the ques	stions I	PART – A	(10 x 1 = 10 Marks)
	Unit - I	CO1	K1	
1.				a) b)
				c) d)
	Unit - I	CO1	K2	
2.				a) b)
				c) d)
	Unit - II	CO2	K1	
3.				a) b)
				c) d)
	Unit - II	CO2	K2	
4.				a) b)
				c) d)
	Unit - III	CO3	K1	
5.				a) b)
				c) d)
	Unit - III	CO3	K2	
6.				a) b)
				c) d)
	Unit - IV	CO4	K1	
7.				a) b)
				c) d)
	Unit - IV	CO4	K2	
8.				a) b)
				c) d)
	Unit - V	CO5	K1	
9.				a) b)
				c) d)
	Unit - V	CO5	K2	
10.				a) b)
				c) d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3						
				OR					
11. b)	Unit - I	CO1	K3						
12. a)	Unit - II	CO2	K3						
	OR								
12. b)	Unit - II	CO2	K3						
13. a)	Unit - III	CO3	K3						
				OR					
13. b)	Unit - III	CO3	K3						
14. a)	Unit - IV	CO4	K3						
				OR					
14. b)	Unit - IV	CO4	K3						
15. a)	Unit - V	CO5	K3						
			·	OR					
15. b)	Unit - V	CO5	K3						

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Information Security									
Course Code	23UCAEC56	L	Р	С						
Category	Elective	4	-	3						
COURSE OBJE	OURSE OBJECTIVES.									

- > To know the objectives of information security
- Understand the importance and application of each of confidentiality, integrity, authentication, and availability
- > Understand various cryptographical algorithms
- > Understand the basic categories of threats to computers and networks
- > To study about the concepts of security in networks, web security

UNIT - I Introduction to Information Security

Introduction to Information Security: Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms.

UNIT - II The Security Problem in Computing& Cryptography

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. **Cryptography:** Concepts and Techniques: Introduction, plaintext and ciphertext, substitution techniques, transposition techniques, encryption and decryption.

UNIT - III Symmetric and Asymmetric Cryptographic Techniques & Authentication and Digital Signatures

Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms. **Authentication and Digital Signatures:** Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos.

UNIT - IV Program Security& Designing Trusted O.S

Program Security: Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-
check to Time-of-use Errors, Viruses, Trapdoors, Salami attack, Man-in-the-middle attacks, Covert
channels. File protection Mechanisms, User Authentication.Designing Trusted O.S: Security policies, models of security, trusted O.S design, Assurance in trusted
O.S. Implementation examples.

UNIT – V Security in Networks& Web Security:

Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security. **Web Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.

Total Lecture Hours

60

12

12

12

12

12

ani

BOOKS FOR STUDY:

- Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education.
- Cryptography and Network Security Principles and Practice, Fourth or Fifth Edition, William Stallings, Pearson.

BOOKS FOR REFERENCES:

- Cryptography and Network Security: C.K. Shyamala, N. Harini, Dr. T.R. Padmanabhan, Wiley India, 1st Edition.
- Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 2nd Edition.
- Information Security, Principles and Practice: Mark Stamp, Wiley India.
- > Principles of Computer Security: W.M. Arthur Conklin, Greg White, TMH.

WEB RESOURCES:

- https://www.geeksforgeeks.org/what-is-information-security/ https://www.tutorialspoint.com/what-is-
- informationsecurity#:~:text=Information%20security%20is%20designed%20and,de struction%2C%20alteration%2C%20and%20disruption
- https://www.tutorialspoint.com/what-is-information-security

Nature of	EMPLC	OYABII	.ITY	✓	SKILL ORIENTED				ENTREPRENEURSHIP			
Curriculum					ΝΑΤΙΟΝΙΑ			Δ.Τ.		CLODAI		
Relevance	LUCAL		KEU	IUNAL	.		NATION	NATIONAL		OLOBAL		•
Changes Made in the Course	Percentag			No Chang	ges Made			New Course		✓		
* Troat	20% 25 42	ch uni	t (20*5-	100%)	an	d calculat	o the norcer	anete	of chanc	a for the cour	20	

Freat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.

COURS	SE OUTC	OMES:							K	LEVEL
After st	udying this	course, th	e students	s will be a	ble to:					
CO1	Understand	network se	curity threa	ts, security	services, an	d counterme	easures		K	K1 to K4
CO2	Understand vulnerability analysis of network security K1 to K4									
CO3	Acquire bac	ckground on	hash funct	ions; auther	ntication; fir	ewalls; intr	usion detect	tion techniq	ues K	K1 to K4
CO4	Gain hands	-on experier	nce with pro	ogramming	and simulat	ion techniqu	ues for secu	rity protoco	ols 📕	K1 to K4
CO5	Apply meth	ods for auth	nentication,	access cont	trol, intrusio	n detection	and preven	tion	K	K1 to K4
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	M	L	M	М	М	М	M	М	Μ
CO2	S	S	М	M	М	L	М	M	М	Μ
CO3	Μ	M	Μ	S	Μ	S	Μ	Μ	Μ	L
CO4	Μ	M	Μ	S	S	S	L	Μ	Μ	Μ
CO 5	L	M	S	M	Μ	М	М	S	М	Μ
;	S- STRON	IG			M – MEC	IUM			L - LO	W

CO / 1	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	-		PSO5
С	01	2	3	3	2			3
С	0 2	2	1	1	2			3
С	03	1	3	2	3			1
С	04	3	3	1	3			3
С	05	2	3	2	3			3
WEIG	HTAGE	10	13	9	13			13
WEIC PERCI OF C CONTI N TO	GHTED ENTAGE OURSE RIBUTIO O POS	67	87	60	87		87	
LESSO	ON PLAN:							
UNIT		Ini	formation Sec	curity		HI	RS	PEDAGOGY
I	Introduction to Information Security: Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware,						2	Black Board/PPT
п	 program analysis and mechanisms. The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, plaintext and ciphertext, substitution techniques, transposition techniques, encryption 							Black Board/PPT
III	Symmetri RS Algo Cryptogra manageme	ic and Asymme rithms. Auther phy for auth ent – Kerberos.	etric Cryptograp ntication and I nentication, Sec	phic Techniques: Digital Signature Cure Hash funct	DES, AES, s: Use of tion, Key	1	2	Black Board/PPT
IV	management – Kerberos.Program Security: Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of-use Errors, Viruses, Trapdoors, Salami attack, Man-in-the-middle attacks, Covert channels. File protection Mechanisms, User Authentication.12Bo Designing Trusted O.S: Security policies, models of security, trusted O S design Assurance in trusted O S. Implementation examples12							Black Board/PPT
v	Security i – Archite Access Co Web Secu Transport	in Networks: T cture, Encryptic ontrols, Wireles urity: Web secu Layer Security,	hreats in network on, Content Inte as Security, Hone arity consideration Secure electronic	cs, Network Securi grity, Strong Auth eypots, Traffic floons, Secure Socket c transaction.	ty Controls nentication, w security. Layer and	1	2	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Internal	Cos	K L ovol	Section MC(n A Qs	Section B	Section C Either or Choice					
Internal	0.05	K Levei	No. of. Questions	K - Level	Choice						
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)					
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)					
		No. of Questions to be asked	4		4	4					
Quest	tion	No. of Questions to be answered	4		2	2					
CIA I & II		Marks for each question	1		5	8					
		Total Marks for each section	4		10	16					

		Dis	tribution of	Marks with	K Level	CIA I & CIA I	I
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2			2	3.6	7.2
	K2	2			2	3.6	1.4
СТА	K3		20		20	35.7	35.7
I	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
	K1	2			2	3.6	7.2
	K2	2			2	3.6	1.2
CIA	K3		20		20	35.7	35.7
II	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of	K Loval	Choice) With	Choice) With				
			Questions	K – Level	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to l	be answered	10		5	5				
Marks	for each c	question	1		5	8				
Total Marks for each section		10		25	40					
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)				

	Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	5			5	3.57	3.57						
K2	5			5	3.57	3.57						
K3		50		50	35.72	35.72						
K4			80	80	57.14	57.14						
Marks	10	50	80	140	100	100						

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P A	ART – A	(10 x 1 = 10 1)	Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
				OR						
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer ALL the questions			PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Internship			
Course Code	23UCAIN51	L	Р	С
Category	Summer Internship	-	-	2

COURSE OBJECTIVES:

The main objectives of this course are to:

- > Introduce the concepts of working ambiance, attitude, adaptability, problem-solving ability,
- > Ability to work with a supervisor, and the capacity to follow directions, etc.
- > Provide exposure to the different phases of developing a computer solution with team spirit.
- > Develop problem-solving skills and soft skills.
- > Learn the essential working skills required in the industry.

REGULATIONS

- 1. Candidates must complete a minimum of 30 hours of an internship program in the industry during the holidays of the fourth semester of their course of study.
- 2. Candidates must undertake a project, analyze it, learn the various stages of solution development, test, validate, and fulfill other related requirements.
- 3. During the third semester, candidates should refine the work carried out during the internship, enhance their solution to meet industry standards, and incorporate constructive feedback received from the industry and/or institution during reviews.
- 4. Candidates must prepare and submit a report documenting their internship experience, following the institution/department's evaluation requirements.
- 5. The internship report must be submitted at the end of the third semester for presentation and Viva-Voce as part of the practical examinations.
- 6. The minimum passing requirement for the internship is 40%.
- 7. If a candidate fails to secure 40% in the internship, they must improve and resubmit it in the next attempt.
- 8. A faculty member from the department will act as a guide to supervise and monitor candidates' progress throughout the internship.
- 9. The assigned faculty member will also serve as the internal examiner during the internship and the Viva-Voce examination.
- 10. Internal marks for the internship will be awarded by the assigned guide/internal examiner.
- 11. Both internal and external examiners will evaluate the internship report, assess the presentation, and conduct the Viva-Voce examination.

Total Hours **30 hours**

INTERNAL MARKS AWARDED FOR THE INTERNSHIP – 25 Marks

- Learning the Work Culture leading towards Performance, Organizations Skills and Relationship with Team Members 5 Marks
- Internship Review 1 (During the beginning of the Semester) 5 Marks
- Internship Review 2 (During the end of the Semester) 5 Marks
- Progress of the Internship by the Candidate's active Participation 10 Marks

EXTERNAL MARKS AWARDED FOR THE INTERNSHIP – 75Marks

- 1. Evaluation of the Internship Report 25 Marks
- 2. Presentation **25 Marks**
- 3. Viva-Voce Examination 25 Marks

Total – 100 Marks

Nature of Course	EMPLOYABILITY			✓	SK	SKILL ORIENTED			ENTRE	[IP		
Curriculum Relevance	LOCAL		REG	IONAL	_		NATION	AL	\checkmark	✓ GLOBAL		
Changes Made in the Course	Percentag	e of Ch	ange	80%	1	No Chang	ges Made			New Course		
* Treat	* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURSE OUTCOMES:										LEVEL	
After studying this course, the students will be able to:											
CO1	Demonstrate leadership skills and effective time management in a professional work environment.									1 to K4	
CO2	Identify and apply appropriate industry tools and technologies to solve real-world problems.									1 to K4	
CO3	Analyze and evaluate the internship reports.									1 to K4	
CO4	Collaborate effectively within a team and contribute to successful project outcomes.									K1 to K4	
CO5	Enhance individual skills in communication, presentation and project organization.									1 to K4	
MAPPING WITH PROGRAM OUTCOMES:											
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO 1	S	М	М	S	S	S	М	S	S	М	
CO2	M	S	S	S	Μ	S	S	M	S	S	
CO3	S	S	Μ	Μ	S	Μ	S	S	S	S	
CO4	S	S	М	S	М	S	М	S	S	S	
CO5	S	S	S	М	S	S	S	M	Μ	S	
\$	S- STRON	IG		M – MEDIUM				L - LOW			
CO / PO MAPPING:											
--	-------------	------	-------------	-------------	------	------	--	--			
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6					
CO1	3	2	3	3	3	3					
CO2	3	3	3	3	2	2					
CO3	3	3	3	3	3	3					
CO4	3	3	3	3	3	3					
CO5	3	3	3	3	2	3					
WEIGHTAGE	15	14	15	15	13	14					
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS	100%	93%	93 %	100%	87%	93%					



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Computer Networks								
Course Code	23UCACC61	L	Р	С					
Category	Core	6	-	4					
COURSE OBJECTIVES:									
 To understand the concept of Data Communication and Computer Network. To gain knowledge on routing algorithms. To impart knowledge about networking and internetworking devices. To study about Network Communication. To learn the concept of Transport Layer. 									
UNIT - I Intro	duction			18					
Introduction – Ne Networks: Internet Communication, G	Introduction – Network Hardware, Software, Reference Models, OSI and TCP/IP Models. Example Networks: Internet, ATM, Ethernet, and Wireless LANs. Physical Layer – Theoretical Basis for Data Communication, Guided Transmission Media.								
UNIT - II Wireless Transmission 18									
Wireless Transmis Multiplexing, and S	sion – Communication Satellites. Telephone System: Structure, L Switching. Data Link Layer: Design Issues – Error Detection and Con	ocal I rrectic	Loop, T m	Trunks,					
UNIT - III Elen	nentary Data Link Protocols.			18					
Elementary Data La Medium Access La	ink Protocols. Sliding Window Protocols. Data Link Layer in the Intervence of the In	ernet. oth.							
UNIT - IV Netw	ork Layer			18					
Network Layer: De IP Protocol – IP Addr	sign Issues, Routing Algorithms, Congestion Control Algorithms. esses – Internet Control Protocols.								
UNIT - V Transport Layer 18									
Transport Layer: Services, Connection Management, Addressing, Establishing and Releasing a Connection. Simple Transport Protocol – Internet Transport Protocols (ITP). Network Security: Cryptography.									
	Total Lecture	Hour	s	90					

BOOKS FOR STUDY:

A. S. Tanenbaum, "Computer Networks," 4th Edition, Prentice Hall of India, 2008.

BOOKS FOR REFERENCES:

- > B. A. Forouzan, "Data Communications and Networking," 4th Edition, Tata McGraw Hill, 2017.
- F. Halsall, "Data Communications, Computer Networks, and Open Systems," Pearson Education, 2008.
- D. Bertsekas and R. Gallagher, "Data Networks," 2nd Edition, PHI, 2008.
- Lamarca, "Communication Networks," Tata McGraw Hill, 2002.

WEB RESOURCES:

- https://en.wikipedia.org/wiki/Computer_network
- https://citationsy.com/styles/computer-networks
- https://www.tpointtech.com/computer-network-tutorial

Nature of Course	EMPLOYABILITY			✓	Sk	KILL ORIE	NTED		ENTREPRENEURSHIP		P	
Curriculum Relevance	LOCAL		REC	IONAL	_		NATION	AL		GLOBAL		✓
Changes Made in the Course	Percentag	10%	No Changes Made				New Course					
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	SE OUTC	OMES:							K	LEVEL
After st	After studying this course, the students will be able to:									
CO1	To understa	and the basic	es of Compu	uter Networ	k architectu	re, OSI, and	l TCP/IP re	ference mod	lels. K	1 to K4
CO2	To gain kno	owledge of 7	Felephone S	Systems usin	ng wireless	networks.			K	1 to K4
CO3	To understand the concept of MAC.								K	1 to K4
CO4	• To analyze the characteristics of Routing and Congestion Control algorithms.								K	1 to K4
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, and DNS. K1 to K4									
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	Μ	Μ	Μ	М	M	M	Μ	М
CO2	S	S	L	Μ	М	М	M	M	M	М
CO3	М	М	М	S	L	S	Μ	М	M	М
CO4	М	M	Μ	S	S	S	L	M	Μ	М
C05	M	M	S	М	M	Μ	Μ	S	Μ	L
	S- STRON	IG			M – MED	IUM			L - LO	N

Academic Council Meeting Held On 17.04.2025

CO / I	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	-]	PSO5
С	01	3	2	2	2		1	
C	0 2	3	2	1	2		2	
С	03	3	3	3	3			2
С	04	3	1	2	2			1
C	05	3	3	1	2			3
WEIG	HTAGE	15	11	9	10			9
WEIC PERCI OF C CONTI N TC	GHTED ENTAGE OURSE RIBUTIO O POS	100	73 60 67				60	
LESSON PLAN:								
UNIT		Co	omputer Netw	vorks		HRS	S P	PEDAGOGY
I	Introducti and TCP/I Example I Physical I Transmiss	on – Network IP Models. Networks: Interr Layer – Theore sion Media	Hardware, Softw net, ATM, Ethern tical Basis for I	vare, Reference M let, and Wireless L. Data Communication	odels, OSI ANs. on, Guided	18]	Black Board/PPT
II	Wireless T Telephone Switching Data Link	Transmission – (e System: Struc g. Layer: Design 1	Communication S ture, Local Loop Issues – Error De	Satellites. p, Trunks, Multipl tection and Correc	lexing, and tion	18]	Black Board/PPT
III	 Elementary Data Link Protocols. Sliding Window Protocols. Data Link Layer in the Internet. Medium Access Layer: Channel Allocation Problem, Multiple Access Protocols, Bluetooth.]	Black Board/PPT
IV	 Network Layer: Design Issues, Routing Algorithms, Congestion Control Algorithms. IP Protocol – IP Addresses – Internet Control Protocols. 							Black Board/PPT
v	Transport Establishi Simple Tr Network S	Layer: Servio ng and Releasin ransport Protoco Security: Crypto	Addressing, P).	18]	Black Board/PPT		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal Co			Section	n A	Section B	Section C Either or Choice		
	Cos	K Level	MCC)s	Either or			
			No. of. Questions	K - Level	Choice			
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)		
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)		
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)		
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)		
		No. of Questions to be asked	4		4	4		
Quest	tion	No. of Questions to be answered	4		2	2		
CIA I & II		Marks for each question	1		5	8		
		Total Marks for each section	4		10	16		

Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %		
	K1	2			2	3.6	7 2		
	K2	2			2	3.6	1.4		
CIA	K3		20		20	35.7	35.7		
I	K4			32	32	57.1	57.1		
-	Marks	4	20	32	56	100	100		
	K1	2			2	3.6	7.2		
	K2	2			2	3.6	1.2		
CIA	K3		20		20	35.7	35.7		
11	K4			32	32	57.1	57.1		
	Marks	4	20	32	56	100	100		

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or			
S. No	COs	K - Level	No. of	K Loval	Choice) With	Choice) With			
		Questions	K – Level	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
No. of Q	uestions to	be Asked	10		10	10			
No. of Que	estions to l	be answered	10		5	5			
Marks for each question		1		5	8				
Total Marks for each section		10		25	40				
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)			

Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5			5	3.57	3.57		
K2	5			5	3.57	3.57		
K3		50		50	35.72	35.72		
K4			80	80	57.14	57.14		
Marks	10	50	80	140	100	100		
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Summative Examinations -	Question	Paper –	Format
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Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P	ART – A	(10 x 1 = 10 N)	larks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions		PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
				OR						
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
		·		OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the ques	tions		PART – C	(5 x 8 = 40 Marks)						
16. a)	Unit - I	CO1	K4								
	OR										
16. b)	Unit - I	CO1	K4								
17. a)	Unit - II	CO2	K4								
				OR							
17. b)	Unit - II	CO2	K4								
18. a)	Unit - III	CO3	K4								
				OR							
18. b)	Unit - III	CO3	K4								
19. a)	Unit - IV	CO4	K4								
				OR							
19. b)	Unit - IV	CO4	K4								
20. a)	Unit - V	CO5	K4								
			·	OR							
20. b)	Unit - V	CO5	K4								

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Data Analytics Using R Programming			
Course Code	23UCACC62	L	Р	С
Category	Core	6	-	4
COURSE OB IE	~~TIVES•			

- > To understand the problem-solving approaches.
- > To learn the basic programming constructs in R Programming.
- > To learn the basic programming constructs in R Programming.
- > To use R Programming data structures lists, tuples, and dictionaries.
- > To do input/output with files in R Programming.

UNIT - I EVOLUTION OF BIG DATA

Evolution of Big Data, best practices for Big Data analytics, Big Data characteristics, validating, the promotion of the value of Big Data, Big Data use cases, characteristics of Big Data applications, perception and quantification of value, understanding Big Data storage, a general overview of high-performance architecture, HDFS, MapReduce and YARN, and the MapReduce programming model.

UNIT - II CONTROL STRUCTURES AND VECTORS

Control structures, functions, scoping rules, dates and times, introduction to functions, preview of some important R data structures, vectors, character strings, matrices, lists, data frames, and classes. Vectors: generating sequences, vectors and subscripts, extracting elements of a vector using subscripts, working with logical subscripts, scalars, vectors, arrays, and matrices. Adding and deleting vector elements, obtaining the length of a vector, matrices and arrays as vectors, vector arithmetic and logical operations, vector indexing, and common vector operations.

UNIT - III LIST AND DATA FRAMES

Lists: Creating lists, general list operations, list indexing, adding and deleting list elements, getting the size of a list, extended example: text concordance, accessing list components and values, applying functions to lists.

Data Frames: Creating data frames, accessing data frames, and other matrix-like operations.

UNIT - IV FACTORS AND TABLES

Factors and levels, common functions used with factors, working with tables, matrix/array-like operations on tables, extracting a sub-table, finding the largest cells in a table, math functions, calculating a probability, cumulative sums and products, minima and maxima, calculus, functions for statistical distributions.

UNIT - V OBJECT-ORIENTED PROGRAMMING

OBJECT-ORIENTED PROGRAMMING Classes, S-Generic functions, writing S-classes, using inheritance in S-classes, implementing a generic function on an S-class, visualization, simulation, code profiling, statistical analysis with R, and data manipulation.

Total Lecture Hours

18

18

18 19. t

18

18

BOOKS FOR STUDY:

- > Roger D. Peng, "R Programming for Data Science," 2012.
- > Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design," 2011.

BOOKS FOR REFERENCES:

- Garrett Grolemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations," 1st Edition, 2014.
- > Venables, W. N., and Ripley, "S Programming," Springer, 2000.

WEB RESOURCES:

- https://www.geeksforgeeks.org/r-programming-for-data-science/
- https://www.w3schools.com/r/
- https://data-flair.training/blogs/r-tutorials-home/

Nature of Course	EMPLOYABILITY				SKILL ORIENTED				ENTREPRENEURSHIP		✓	
Curriculum Relevance	LOCAL	OCAL REGION		JIONAL	,		NATIONAL			GLOBAL		✓
Changes Made in the Course	Percentage of Change				No Changes Made				New Course		✓	
* Treat	* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COUR	SE OUTCO	OMES:							K	LEVEL	
After st	udying this	course, th	e students	will be al	ole to:						
CO1	Work with	big data to	ols and its	analysis te	echniques.				K	1 to K4	
CO2	Analyze da	K	1 to K4								
CO3	Learn and apply different mining algorithms and recommendation systems for large K1 to K4										
CO4	Perform analytics on data streams. K1 to K4										
CO5	Learn NoS	QL databa	ses and ma	nagement.					K	1 to K4	
MAPPI	NG WITH	PROGR	AM OUT	COMES:							
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	L	M	М	М	M	М	Μ	М	М	
CO2	S	S	М	М	М	М	М	L	Μ	М	
CO3	M	М	М	S	L	S	М	Μ	М	М	
CO4	4 M M L S S S M M M										
CO5	M	М	S	М	М	М	М	S	М	L	
	S- STRON	IG]	M – MED	IUM			L - LO	N	

CO / 1	PO MAPP	ING:							
C	cos	PSO1	PSO2	PSO3	PSO4		PSO5	PSO6	
С	01	3	2	1	3		1	3	
С	02	3	3	2	2		2	2	
С	CO 3 1 2 3 1				1		2	1	
С	04	2	2	2	2		2	2	
С	05	2	2	2	1		3	1	
WEIG	HTAGE	11	11	10	9		10	9	
WEIC PERCI OF C CONT	VEIGHTED RCENTAGE F COURSE73736760DNTRIBUTIO N TO POSN6760						67	60	
LESSO	ON PLAN:								
UNIT		Data Analy	tics Using R	Programming		HR	S PE	DAGOGY	
I	Evolution characteris Data use of quantificat overview YARN, ar	of Big Data, b stics, validating cases, characteri tion of value, of high-perform the MapRedu	best practices for the promotion of stics of Big Data understanding I mance architectu ce programming	Big Data analytics of the value of Big a applications, pero Big Data storage, ure, HDFS, MapR model.	s, Big Data g Data, Big ception and a general Reduce and	18	i B(BLACK DARD / LCD	
Π	YARN, and the MapReduce programming model.Control structures, functions, scoping rules, dates and times, introduction to functions, preview of some important R data structures, vectors, character strings, matrices, lists, data frames, and classes. Vectors: generating sequences, vectors and subscripts, extracting elements of a vector using subscripts, working with logical subscripts, scalars, vectors, arrays, and matrices. Adding and deleting vector elements, obtaining the length of a vector, matrices and arrays as vectors, vector arithmetic and logical operations, vector indexing, and common vector operations.BLACK								
III	Lists: Cre deleting li concordan to lists.	eating lists, gen st elements, get ice, accessing li	eral list operatio tting the size of a st components an	ons, list indexing, a list, extended ex nd values, applyin	adding and ample: text g functions	18	I B	3LACK OARD / LCD	

writing S-classes,

matrix-like operations.

OBJECT-ORIENTED

distributions.

functions,

IV

V

Data Frames: Creating data frames, accessing data frames, and other

Factors and levels, common functions used with factors, working with tables, matrix/array-like operations on tables, extracting a sub-table, finding the

largest cells in a table, math functions, calculating a probability, cumulative

sums and products, minima and maxima, calculus, functions for statistical

PROGRAMMING

using inheritance

Classes,

in

S-Generic

S-classes,

18

18

BLACK

BOARD /

LCD

BLACK

BOARD /

implem	enting a	generic	function o	n an S	-class,	vis	ualiza	ation,	LCD
simulat	on, code	profiling,	statistical	analysis	with	R,	and	data	
manipu	ation.								

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section	n A	Section B				
Internal	Cos	K Level	MCC)s	Either or	Section C			
merman			No. of. Questions	K - Level	Choice	Either or Choice			
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)			
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)			
	1	No. of Questions to be asked	4		4	4			
Question Pattern CIA I & II		No. of Questions to be answered	4		2	2			
		Marks for each question	1		5	8			
		Total Marks for each section	4		10	16			

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
	K1	2			2	3.6	7 2				
	K2	2			2	3.6	1.2				
СІА	K3		20		20	35.7	35.7				
I	K4			32	32	57.1	57.1				
-	Marks	4	20	32	56	100	100				
	K1	2			2	3.6	7.2				
	K2	2			2	3.6	1.2				
CIA	K3		20		20	35.7	35.7				
II	K4			32	32	57.1	57.1				
	Marks	4	20	32	56	100	100				

- K1- Remembering and recalling facts with specific answers
- K2- Basic understanding of facts and stating main ideas with general answers
- K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or			
S. No COs	K - Level	No. of	K Lovol	Choice) With	Choice) With				
			Questions	K Level	K - LEVEL	K - LEVEL			
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
No. of Q	uestions to	be Asked	10		10	10			
No. of Que	estions to	be answered	10		5	5			
Marks for each question		1		5	8				
Total Marks for each section			10		25	40			
	(Figu	ures in paren	thesis denotes,	questions show	uld be asked with the give	en K level)			

Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5			5	3.57	3.57			
K2	5			5	3.57	3.57			
K3		50		50	35.72	35.72			
K4			80	80	57.14	57.14			
Marks	10	50	80	140	100	100			
NB: Higher level of performance of the students is to be assessed by attempting higher level of K									
levels.									

Summative Examination	s - Question Pa	aper – Format
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Q. No.	Unit	СО	K-level		
Answer A	LL the quest	ions P A	ART – A	(10 x 1 = 1)	0 Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
OR										
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name R Programming Lab										
Course Code	23UCACP61	L	Р	С						
Category	Core	-	6	4						
COURSE OBJEC	CTIVES:									
 Acquire programming skills in core R Programming. Acquire object-oriented programming skills in R Programming. Develop the skill of designing graphical-user interfaces (GUI) in R Programming. Acquire R Programming skills to move into specific branches. 										
S. No. Lab Exercise 90										
 Program to e upon the use Program to f parameters f Write a prog Create a function Write a prog Implement d Write a prog Create a pie Create a data Program to f Write an R p 	r's choice. ind the area of a rectangle, square, circle, and triangle by accepting s rom the user. ram to find a list of even numbers from 1 to n using R loops. ction to print squares of numbers in sequence. ram to join columns and rows in a data frame using cbind() and rbin ifferent string manipulation functions in R. ifferent data structures in R (Vectors, Lists, Data Frames). ram to read a CSV file and analyse the data in the file in R. chart and bar chart using R. a set and do statistical analysis on the data using R. ind the factorial of the given number using a recursive function. brogram to count the number of even and odd numbers from an array	suitab d() in $\frac{7}{2}$ of N	R.	<u>г</u> .						
	Total Lecture	Hou	rs	90						

BOOKS FOR STUDY:

- > Roger D. Peng, "R Programming for Data Science," 2012.
- Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design," 2011.

BOOKS FOR REFERENCES:

- Garrett Grolemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations," 1st Edition, 2014.
- > Venables, W. N., and Ripley, "S Programming," Springer, 2000.

WEB RESOURCES:

- https://www.geeksforgeeks.org/data-analysis-using-r/
- https://www.w3schools.com/r/r_syntax.asp
- https://www.tutorialspoint.com/r/index.htm

Nature of Course	EMPLOYABILITY				SKILL ORIENTED			✓	ENTRE)	
Curriculum Relevance	LOCAL REGION			IONAL	_		NATIONAL			GLOBAL	\checkmark
Changes Made in the Course	Percentage of Change			40%]	No Chang	ges Made			New Course	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURS	E OUTCO	OMES:							K	LEVEL	
After stu	dying this	course, th	e students	s will be al	ble to:						
CO1	Acquire pro	gramming s	skills in core	e R Progran	nming.				K	K1 to K4	
CO2	Acquire ob	ject-oriente	d programm	ning skills in	n R Progran	nming.			K	K1 to K4	
CO3	Develop the skill of designing graphical user interfaces (GUI) in R Programming.									K1 to K4	
CO4	Acquire R Programming skills to move into specific branches.								K	K1 to K4	
CO5	5								K	K1 to K4	
MAPPII	NG WITH	PROGR	AM OUT	COMES:							
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	Μ	М	S	S	Μ	Μ	Μ	L	М	
CO2	S	Μ	L	S	M	М	Μ	S	Μ	M	
CO3	S	М	S	М	M	М	М	S	Μ	L	
CO4	M	L	S	S	Μ	M	M	M	Μ	M	
CO5	S	М	М	S	S	L	М	M	Μ	М	
S	- STRON	ſG			M – MED	IUM		L - LOW			

Academic Council Meeting Held On 17.04.2025

CO / PO MAPPI	CO / PO MAPPING:											
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6						
CO 1	3	3	3	3	2	2						
CO 2	2	3	3	3	3	3						
CO 3	1	3	3	3	1	2						
CO 4	2	3	3	3	2	1						
CO 5	2	3	3	3	2	2						
WEIGHTAGE	10	15	15	15	10	10						
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS	67	100	100	100	67	67						

LESSON PLAN:

UNIT	R Programming Lab	HRS	PEDAGOGY
1	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon the user's choice.		
2	Program to find the area of a rectangle, square, circle, and triangle by accepting suitable input parameters from the user.		
3	Write a program to find a list of even numbers from 1 to n using R loops.		
4	Create a function to print squares of numbers in sequence.		
5	Write a program to join columns and rows in a data frame using cbind() and rbind() in R.		
6	Implement different string manipulation functions in R.	75	Demonstrat
7	Implement different data structures in R (Vectors, Lists, Data Frames).	10	on Training
8	Write a program to read a CSV file and analyze the data in the file in R.		
9	Create a pie chart and bar chart using R.		
10	Create a data set and do statistical analysis on the data using R.		
11	Program to find the factorial of the given number using a recursive function.		
12	Write an R program to count the number of even and odd numbers from an array of N numbers.		

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Intern al	Cos	K Level	Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding & Implementation	Debuggin g & Output				
	CO1	K1	5								
CI	CO2	K2		5							
AI	CO3	K3			5						
	CO4	К3				5					
	CO5	K4					5				
	JL	No. of Questions to be asked	2	2	2	2	2				
Question		No. of Questions to be answered	2	2	2	2	2				
CL	A	Marks for each question	2.5	2.5	2.5	2.5	2.5				
		Total Marks for each section	5	5	5	5	5				

	Distribution of Marks with K Level CIA										
	K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	Debuggi ng & Output	Total Marks	% of (Mar ks witho ut choic e)	Cons olida ted %		
	K1	5					5	20	20		
	K2		5				5	20	20		
	K3			5	5		10	40	40		
CIA	K4					5	5	20	20		
	Marks						25	100	100		

- K1- Remembering and recalling facts with specific answers
- K2- Basic understanding of facts and stating main ideas with general answers
- K3- Application oriented- Solving Problems
- K4- Examining, analyzing, presentation and make inferences with evidences

	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
S.No.	S.No. Cos K Level		Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding& Implementation	Debuggin g & Output				
1	CO1	K1	15								
2	CO2	K2		15							
3	CO3	K3			15						
4	CO4	K3				15					
5	CO5	K4					15				
		No. of Questions to be asked	2	2	2	2	2				
Question Pattern		No. of Questions to be answered	2	2	2	2	2				
		Marks for each question	7.5	7.5	7.5	7.5	7.5				
		Total Marks for each section	15	15	15	15	15				

		Distributi	ion of Mark	s with K	Level			
K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	Debuggi ng & Output	Total Marks	% of (Marks without choice)	Consol idated %
K1	15					15	20	20
K2		15				15	20	20
K3			15	15		30	40	40
K4					15	15	20	20
Marks	15	15	15	15	15	75	100	100

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Co	ourse Name	IoT and its Applications			
Co	ourse Code	23UCAEC61	L	Р	С
Ca	tegory	Elective	5	-	3

COURSE OBJECTIVES:

- > Use of Devices, Gateways, and Data Management in IoT.
- > Design IoT applications in different domains and be able to analyze their performance.
- > Implement basic IoT applications on embedded platforms.
- > Gain knowledge on Industry Internet of Things.
- > Learn about the privacy and security issues in IoT.

UNIT – I IOT & WEB TECHNOLOGY

IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT - II M2M TO IOT

M2M to IoT – A Basic Perspective – Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT – An Architectural Overview – Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT - III IOT ARCHITECTURE

IoT Architecture - State of the Art – Introduction, State of the Art, Architecture. Reference Model - Introduction, Reference Model and Architecture, IoT Reference Model,

UNIT - IV IOT REFERENCE ARCHITECTURE

IoT Reference Architecture - Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant Architectural Views.

UNIT - V IOT APPLICATIONS

IoT Applications for Value Creation - Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, IoT for Retailing Industry, IoT for Oil and Gas Industry, Home Management.

Total Lecture Hours 75 HRS

15 HRS

15 HRS

15 HRS

15 HRS

15 HRS

BOOKS FOR STUDY:

Vijay Madisetti and Arshdeep Bahga, —Internet of Things: (A Hands-on Approach) I, Universities Press (INDIA) Private Limited, 2014, 1st Edition.

BOOKS FOR REFERENCES:

- Michael Miller, —The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the Worldl, Kindle version.
- Francis da Costa, —Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications, 2013, 1st Edition.
- Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practicell.

Cuno Pfister, —Getting Started with the Internet of Things, O'Reilly Media, 2011.

WEB RESOURCES:

- https://www.tpointtech.com/internet-of-things-applications
- https://www.tutorialspoint.com/internet_of_things/index.htm
- https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

Nature of Course	EMPLOYABILITY				SKILL ORIENTED				ENTREPRENEURSHIP			\checkmark
Curriculum Relevance	LOCAL		REG	IONAL	,		NATIONAL			GLOBAL		\checkmark
Changes Made in the Course	Percentage of Change			60%	No C	han	ges Made			New Course		

* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.

COURS	SE OUTC	OMES:							K	LEVEL	
After st	udying this	course, th	e students	s will be a	ble to:						
CO1	Work with	i big data to	ools and its	s analysis t	echniques.				K	K1 to K4	
CO2	Analyze data by utilizing clustering and classification algorithms.										
СОЗ	Learn and apply different mining algorithms and recommendation systems for large volumes of data.									1 to K4	
CO4	Perform analytics on data streams.									K1 to K4	
CO5	5 Learn NoSQL databases and management.									1 to K4	
MAPPI	NG WITH	I PROGR	AM OUT	COMES:							
CO/PC) PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	М	Μ	M	М	L	M	Μ	Μ	Μ	
CO2	S	S	Μ	М	L	М	М	Μ	Μ	Μ	
CO 3	M	М	М	S	М	S	М	L	Μ	M	
CO4	M	М	L	S	S	S	М	Μ	Μ	M	
CO5	M	М	S	М	М	М	L	S	Μ	M	
;	S- STRON	IG			M – MEI	DIUM			L - LO	W	

Academic Council Meeting Held On 17.04.2025

CO / I	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	ŀ		PSO5
С	01	1	2	2	3		1	
С	0 2	2	2	2	2	3		3
С	03	3	1	1	1	2		2
С	04	2	2	2	2			1
С	05	2	2	3	2			2
WEIG	HTAGE	11	9	10	10			9
WEIGHTED PERCENTAGE OF COURSE73606767CONTRIBUTIO N TO POS73606767								60
LESSC	ON PLAN:							
UNIT		ΙοΤ	HRS		PEDAGOGY			
I	 IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on 							Black Board/PPT
II	 M2M to IoT – A Basic Perspective – Introduction, Some Definitions M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT – An Architectural Overview – Building an architecture, Main design principles and needed 						5	Black Board/PPT
III	IoT Arch Architectu Architectu	itecture - State ire. Reference ire, IoT Referen	e of the Art – In Model - Introdu ce Model.	ntroduction, State	of the Art, Model and	15	5	Black Board/PPT
IV	IoT Ref Information	erence Archit on View, Deplo Iral Views.	ecture - Intro yment and Oper	oduction, Function ational View, Othe	nal View, er Relevant	15	5	Black Board/PPT
v	IoT Appl for indust Smart Ap Industry, I	ications for Va ry: Future Facto plications, IoT Home Managem	Ilue Creation - I bry Concepts, Br for Retailing In ment.	ntroduction, IoT a ownfield IoT, Sma dustry, IoT for O	applications art Objects, il and Gas	15	5	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	n A	Section D	Section C Either or Choice					
Internal	Cos	K Level	MCC	Qs	Either or						
	0.02		No. of. Questions	K - Level	Choice						
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)					
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)					
	<u>L</u>	No. of Questions to be asked	4		4	4					
Quest	tion	No. of Questions to be answered	4		2	2					
Pattern CIA I & II		Marks for each question	1		5	8					
		Total Marks for each section	4		10	16					

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
	K1	2			2	3.6	7 2				
	K2	2			2	3.6	1.4				
CIA	K3		20		20	35.7	35.7				
I	K4			32	32	57.1	57.1				
-	Marks	4	20	32	56	100	100				
	K1	2			2	3.6	7.2				
	K2	2			2	3.6	1.2				
CIA	K3		20		20	35.7	35.7				
II	K4			32	32	57.1	57.1				
	Marks	4	20	32	56	100	100				

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of	V Lovel	Choice) With	Choice) With				
			Questions	K – Level	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to l	be answered	10		5	5				
Marks for each question			1		5	8				
Total Marks for each section			10		25	40				
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)				

Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5			5	3.57	3.57				
K2	5			5	3.57	3.57				
K3		50		50	35.72	35.72				
K4			80	80	57.14	57.14				
Marks	10	50	80	140	100	100				

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Q. No.	Unit	СО	K-level				
Answer A	LL the quest	tions P A	ART – A	(10 x 1 = 10 Marks)			
	Unit - I	CO1	K1				
1.				a)	b)		
				c)	d)		
	Unit - I	CO1	K2				
2.				a)	b)		
				c)	d)		
	Unit - II	CO2	K1				
3.				a)	b)		
				c)	d)		
	Unit - II	CO2	K2				
4.				a)	b)		
				c)	d)		
	Unit - III	CO3	K1				
5.				a)	b)		
				c)	d)		
	Unit - III	CO3	K2				
6.				a)	b)		
				c)	d)		
	Unit - IV	CO4	K1				
7.				a)	b)		
				c)	d)		
	Unit - IV	CO4	K2				
8.				a)	b)		
				c)	d)		
	Unit - V	CO5	K1				
9.				a)	b)		
				c)	d)		
	Unit - V	CO5	K2				
10.				a)	b)		
				c)	d)		

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3						
	OR								
11. b)	Unit - I	CO1	K3						
12. a)	Unit - II	CO2	K3						
	OR								
12. b)	Unit - II	CO2	K3						
13. a)	Unit - III	CO3	K3						
				OR					
13. b)	Unit - III	CO3	K3						
14. a)	Unit - IV	CO4	K3						
				OR					
14. b)	Unit - IV	CO4	K3						
15. a)	Unit - V	CO5	K3						
			·	OR					
15. b)	Unit - V	CO5	K3						

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
				OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Image Processing						
Course Code	23UCAEC62	L	Р	С			
Category	Elective	5	-	3			
COURSE OBJECTIVES:							

- > To learn fundamentals of digital image processing.
- > To learn about various 2D Image transformations.
- > To learn about various image enhancement processing methods and filters.
- > To learn about various classification of Image segmentation techniques.
- > To learn about various image compression techniques.

UNIT - I Digital Image Fundamentals

Digital Image Fundamentals: Image representation - Basic relationship between pixels, Elements of DIP system - Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems - Mathematical Morphology - Structuring Elements - Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method - 2D Convolution Through Matrix Analysis.

UNIT – II 2D Image transforms

2D Image transforms: Properties of 2D-DFT - Walsh transform - Hadamard transform - Haar transform - Discrete Cosine Transform - Karhunen-Loeve Transform - Singular Value Decomposition. Properties of 2D-DFT - Walsh transform - Hadamard transform - Haar transform - Discrete Cosine Transform - Karhunen-Loeve Transform - Singular Value Decomposition.

UNIT - III Image Enhancement

Image Enhancement: Spatial domain methods - Point processing - Intensity transformations - Histogram processing - Spatial filtering - smoothing filter - Sharpening filters - Frequency domain methods: low-pass filtering, high-pass Filtering - Homomorphic filter.

UNIT - IV Image segmentation

Image segmentation: Classification of Image segmentation techniques - Region approach - Clustering techniques - Segmentation based on thresholding - Edge-based segmentation - Classification of edges - Edge detection - Hough transform - Active contour.

UNIT - V Image Compression

Image Compression: Need for compression - Redundancy - Classification of image - Compression schemes - Huffman coding - Arithmetic coding - Dictionary-based compression - Transform-based compression.

Total Lecture Hours 60

12

12

12

12

BOOKS FOR STUDY:

- S Jayaraman, S Esakkirajan, T Veerakumar, *Digital Image Processing*, Tata McGraw Hill, 2015
- Sonzalez Rafael C, Digital Image Processing, Pearson Education, 2009

BOOKS FOR REFERENCES:

- > Jain Anil K, Fundamentals of Digital Image Processing, PHI, 1988
- Kenneth R Castleman, *Digital Image Processing*, Pearson Education, 2/e, 2003
- Pratt William K, *Digital Image Processing*, John Wiley, 4/e, 2007

WEB RESOURCES:

- https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing %20- Vijaya%20Raghavan.pdf
- http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Pr ocessing%203 rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woodsilovepdf-compressed.pdf
- https://dl.acm.org/doi/10.5555/559707 https://www.ijert.org/imageprocessing-using-web-2-0-2-give this as reference link url

Nature of Course	EMPLOYABILITY			✓	SK	ILL ORIE	ENTED		ENTRE	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REG	IONAL			NATION	AL		GLOBAL		\checkmark
Changes Made in the Course	Percentage of Change					No Chang	ges Made			New Course		✓
	A A C C			100 01					0 1	0 (1		

* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.

COURS	E OUTC	OMES:							K	LEVEL
After stu	udying this	course, th	e students	s will be al	ble to:					
CO1	Understan	d the fund	amental co	oncepts of	digital im	age proces	ssing		K	1 to K4
CO2	Understan	d various 2	D Image tr	ansformat	ions				K	1 to K4
CO3	Understand image enhancement processing techniques and filters									
CO4	Understand the classification of Image segmentation techniques									1 to K4
CO5	5 Understand various image compression techniques. K									1 to K4
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	Μ	Μ	М	L	M	Μ	Μ	Μ	М
CO2	S	S	L	М	M	M	Μ	Μ	Μ	М
CO3	М	М	M	S	Μ	S	М	М	Μ	L
CO4	М	L	M	S	S	S	М	Μ	Μ	М
CO5	М	М	S	М	M	M	Μ	S	L	М
5	S- STRON	IG			M – MED	IUM			L - LOV	N

CO / I	PO MAPP	ING:						
C	os	PSO1	PSO2	PSO3	PSO4	•	PSO5	PSO6
С	01	1	3	2	2		3	1
С	0 2	3	2	3	2		3	3
С	03	3	3	2	2		2	1
С	204 3		3	3	1		3	3
C	05	3	2	3	3		3	3
WEIG	HTAGE	13	13	13	10		14	11
WEIC PERCI OF C CONTI N TO	GHTED ENTAGE OURSE RIBUTIO O POS	87	87	87	67		93	73
LESSC	ON PLAN:							
UNIT]		HRS	S PE	DAGOGY		
I	Digital Im between pi Processing Morpholog Convolutio Through M	age Fundamenta xels, Elements of - 2D Systems - C gy - Structuring E on - 2D Convoluti Iatrix Analysis.	onship mage atical sing - 2D onvolution	12	12 Black Board/PPT			
II	2D Image transform - Transform	transforms: Proj - Haar transform - - Singular Value	perties of 2D-DFT Discrete Cosine T Decomposition.	- Walsh transform - Fransform - Karhune	Hadamard n-Loeve	12 Black Board/PPT		Black oard/PPT
III	Image Enhancement: Spatial domain methods - Point processing - Intensity transformations - Histogram processing - Spatial filtering - smoothing filter - Sharpening filters - Frequency domain methods: low-pass filtering, high-pass Filtering - Homomorphic filter.						В	Black oard/PPT
IV	Image segmentation: Classification of Image segmentation techniques - Region approach - Clustering techniques - Segmentation based on thresholding - Edge-based segmentation - Classification of edges - Edge detection - Hough12Black Board/PPTtransform - Active contour.121212							
v	Image Col image - Co Dictionary	mpression: Need ompression schem -based compressi	for compression - les - Huffman codi on - Transform-bas	Redundancy - Class ng - Arithmetic codi sed compression.	ification of ng -	12	В	Black oard/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Section	n A	Section B	Section C Either or Choice					
Internal	Cos	K Level	MCQ	Qs	Either or						
			No. of. Questions	K - Level	Choice						
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)					
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)					
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)					
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4					
		No. of Questions to be answered	4		2	2					
		Marks for each question	1		5	8					
		Total Marks for each section	4		10	16					

	Distribution of Marks with K Level CIA I & CIA II											
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %					
	K1	2			2	3.6	7.2					
	K2	2			2	3.6	1.4					
CIA	K3		20		20	35.7	35.7					
I	K4			32	32	57.1	57.1					
-	Marks	4	20	32	56	100	100					
	K1	2			2	3.6	7.2					
	K2	2			2	3.6	1.2					
CIA	K3		20		20	35.7	35.7					
II	K4			32	32	57.1	57.1					
	Marks	4	20	32	56	100	100					

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or					
S. No	COs	K - Level	No. of	K Loval	Choice) With	Choice) With					
			Questions	K – Level	K - LEVEL	K - LEVEL					
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)					
No. of Q	uestions to	be Asked	10		10	10					
No. of Que	estions to l	be answered	10		5	5					
Marks for each question		question	1		5	8					
Total Marks for each section		ch section	10		25	40					
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)					

	Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %						
K1	5			5	3.57	3.57						
K2	5			5	3.57	3.57						
K3		50		50	35.72	35.72						
K4			80	80	57.14	57.14						
Marks	10	50	80	140	100	100						

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative Examinations -	Question	Paper –	Format
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Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P	ART – A	(10 x 1 = 10 N)	larks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
				OR						
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
	OR									
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the quest	tions	PART –	C (5 x 8 = 40 Marks)						
16. a)	Unit - I	CO1	K4							
				OR						
16. b)	Unit - I	CO1	K4							
17. a)	Unit - II	CO2	K4							
	OR									
17. b)	Unit - II	CO2	K4							
18. a)	Unit - III	CO3	K4							
				OR						
18. b)	Unit - III	CO3	K4							
19. a)	Unit - IV	CO4	K4							
				OR						
19. b)	Unit - IV	CO4	K4							
20. a)	Unit - V	CO5	K4							
				OR						
20. b)	Unit - V	CO5	K4							

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Human Computer Interaction							
Course Code	23UCAEC63	L	Р	С				
Category	Elective	5	-	3				

COURSE OBJECTIVES:

- > To learn about the foundations of Human-Computer Interaction.
- > To learn the design and software process technologies.
- > To learn HCI models and theories.
- > To learn Mobile Ecosystem.
- > To learn the various types of Web Interface Design.

UNIT - I FOUNDATIONS OF HCI

FOUNDATIONS OF HCI: The Human: I/O channels – Memory. Reasoning and problem solving. The Computer: Devices – Memory – Processing and networks. Interaction: Models – Frameworks – Ergonomics – Styles – Elements – Interactivity – Paradigms. Case Studies.

UNIT – II DESIGN & SOFTWARE PROCESS:

DESIGN & SOFTWARE PROCESS: Interactive Design: Basics – Process – Scenarios. Navigation: Screen design, Iteration, and Prototyping. HCI in software process: Software life cycle – Usability engineering – Prototyping in practice – Design rationale. Design rules: Principles, Standards, Guidelines, Rules. Evaluation Techniques – Universal Design.

UNIT - III MODELS AND THEORIES:

MODELS AND THEORIES: HCI Models: Cognitive models – Socio-Organizational issues and stakeholder requirements – Communication and collaboration models – Hypertext, Multimedia & WWW.

UNIT - IV Mobile HCI

Mobile HCI: Mobile Ecosystem: Platforms, Application frameworks. Types of Mobile Applications: Widgets, Applications, Games. Mobile Information Architecture, Mobile 2.0. Mobile Design: Elements of Mobile Design, Tools. Case Studies.

UNIT - V WEB INTERFACE DESIGN:

WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.

Total Lecture Hours 60

12 s ai

12

12



12
BOOKS FOR STUDY:

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human-Computer Interaction, III Edition, Pearson Education, 2004. (UNIT I, II & III)
- > Brian Fling, *Mobile Design and Development*, I Edition, O'Reilly Media Inc., 2009. (UNIT IV)
- > Bill Scott and Theresa Neil, *Designing Web Interfaces*, First Edition, O'Reilly, 2009. (UNIT V)

BOOKS FOR REFERENCES:

Ben Shneiderman, Designing the User Interface: Strategies for Effective Human-Computer Interaction, V Edition, Pearson Education.

WEB RESOURCES:

- https://www.interaction-design.org/literature/topics/human-computerinteraction
- https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction
- https://link.springer.com/10.1007/978-0-387-39940-9_192

Nature of Course	EMPLOYABILITY		✓	Sŀ	SKILL ORIENTED			ENTREPRENEURSHIP		D		
Curriculum Relevance	LOCAL REG		GIONAL	_		NATIONAL			GLOBAL		\checkmark	
Changes Made in the Course	Percentag	Percentage of Change				No Chang	ges Made			New Course		✓
* Treat	* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURS	URSE OUTCOMES:									
After stu	udying this	course, th	e students	will be al	ole to:					
CO1	Understan	d the funda	mentals of	HCI.					K	1 to K4
CO2	Understand the design and software process technologies.									1 to K4
CO3	Understand HCI models and theories.									1 to K4
CO4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture, and design. K1 to K4									
CO5	Understan	d the variou	us types of	Web Inter	face Desig	n.			K	1 to K4
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	М	L	Μ	М	M	M	M	М	M
CO2	S	S	М	М	М	М	Μ	M	М	L
CO 3	L	М	M	S	М	S	M	M	М	М
CO4	М	М	L	S	S	S	Μ	М	М	M
CO5	М	М	S	М	М	М	М	S	L	M
\$	S- STRONG M – MEDIUM L -							L - LO	W	

CO / PO MAPPING:									
COS	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	2	3	2	2	3				
CO 2	3	2	1	1	3				
CO 3	2	3	3	3	1				
CO 4	2	2	1	3	3				
CO 5	1	3	2	3	3				
WEIGHTAGE	10	13	9	12	13				
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTIO N TO POS	67	87	60	80	87				

LESSON PLAN:

UNIT	Human Computer Interaction	HRS	PEDAGOGY
I	FOUNDATIONS OF HCI: The Human: I/O channels – Memory. Reasoning and problem solving. The Computer: Devices – Memory – Processing and networks. Interaction: Models – Frameworks – Ergonomics – Styles – Elements – Interactivity – Paradigms. Case Studies.	12	Black Board/PPT
II	DESIGN & SOFTWARE PROCESS: Interactive Design: Basics – Process – Scenarios. Navigation: Screen design, Iteration, and Prototyping. HCI in software process: Software life cycle – Usability engineering – Prototyping in practice – Design rationale. Design rules: Principles, Standards, Guidelines, Rules. Evaluation Techniques – Universal Design.	12	Black Board/PPT
III	MODELS AND THEORIES: HCI Models: Cognitive models – Socio- Organizational issues and stakeholder requirements – Communication and collaboration models – Hypertext, Multimedia, and <u>WWW</u> .	12	Black Board/PPT
IV	Mobile HCI: Mobile Ecosystem: Platforms, Application frameworks. Types of Mobile Applications: Widgets, Applications, Games. Mobile Information Architecture, Mobile 2.0. Mobile Design: Elements of Mobile Design, Tools. Case Studies.	12	Black Board/PPT
v	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.	12	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
			Section	n A	Section B	Section C Either or Choice			
Internal	Cos	K Level	MCQ)s	Either or				
			No. of. Questions	K - Level	Choice				
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)			
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)			
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4			
		No. of Questions to be answered	4		2	2			
		Marks for each question	1		5	8			
		Total Marks for each section	4		10	16			

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %			
	K1	2			2	3.6	7 2			
	K2	2			2	3.6	- 1.2			
CIA	K3		20		20	35.7	35.7			
I	K4			32	32	57.1	57.1			
	Marks	4	20	32	56	100	100			
	K1	2			2	3.6				
	K2	2			2	3.6	1.2			
CIA	K3		20		20	35.7	35.7			
II	K4			32	32	57.1	57.1			
	Marks	4	20	32	56	100	100			

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or		
S. No COs	K - Level	No. of	K – Level	Choice) With	Choice) With			
			Questions	IN Level	K - LEVEL	K - LEVEL		
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)		
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)		
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)		
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)		
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)		
No. of Q	uestions to	be Asked	10		10	10		
No. of Questions to be answered		be answered	10		5	5		
Marks for each question		juestion	1		5	8		
Total Marks for each section		ch section	10		25	40		
	(Fig	ires in naren	thesis denotes.	questions sho	uld be asked with the give	en K level)		

Distribution of Marks with K Level Section A % of Section **B** Section C (Multiple Total (Marks K Level (Either or (Either/ or **Consolidated %** Choice Marks without Choice Choice) **Questions**) choice) 5 3.57 **K1** 5 3.57 K2 5 5 3.57 3.57 **K3** 50 50 35.72 35.72 K4 80 80 57.14 57.14 **50** 80 100 Marks 10 **140** 100 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Summative	Examinations -	Question	Paper –	Format
		Y		

Q. No.	Unit	CO	K-level		
Answer A	LL the que	stions I	PART – A	(10 x 1 = 10 M)	arks)
	Unit - I	CO1	K1		
1.				a) b)
				c) d)
	Unit - I	CO1	K2		
2.				a) b)
				c) d)
	Unit - II	CO2	K1		
3.				a) b)
				c) d)
	Unit - II	CO2	K2		
4.				a) b)
				c) d)
	Unit - III	CO3	K1		
5.				a) b)
				c) d)
	Unit - III	CO3	K2		
6.				a) b)
				c) d)
	Unit - IV	CO4	K1		
7.				a) b)
				c) d)
	Unit - IV	CO4	K2		
8.				a) b)
				c) d)
	Unit - V	CO5	K1		
9.				a) b)
				c) d)
	Unit - V	CO5	K2		
10.				a) b)
				c) d)

Answer	Answer ALL the questions		PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3						
	OR								
11. b)	Unit - I	CO1	K3						
12. a)	Unit - II	CO2	K3						
				OR					
12. b)	Unit - II	CO2	K3						
13. a)	Unit - III	CO3	K3						
				OR					
13. b)	Unit - III	CO3	K3						
14. a)	Unit - IV	CO4	K3						
				OR					
14. b)	Unit - IV	CO4	K3						
15. a)	Unit - V	CO5	K3						
				OR					
15. b)	Unit - V	CO5	K3						

Answer A	LL the ques	tions	PART –	C (5 x 8 = 40 Marks)						
16. a)	Unit - I	CO1	K4							
				OR						
16. b)	Unit - I	CO1	K4							
17. a)	Unit - II	CO2	K4							
	OR									
17. b)	Unit - II	CO2	K4							
18. a)	Unit - III	CO3	K4							
				OR						
18. b)	Unit - III	CO3	K4							
19. a)	Unit - IV	CO4	K4							
				OR						
19. b)	Unit - IV	CO4	K4							
20. a)	Unit - V	CO5	K4							
				OR						
20. b)	Unit - V	CO5	K4							

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Cryptography		
Course Code	23UCAEC64 L	Р	С
Category	Elective 5	_	3
COURSE OBJE	CTIVES:		
 To understa To acquire l authenticity To understa To understa To design set 	and the fundamentals of Cryptography. knowledge on standard algorithms used to provide confidentiality, integr , and the various key distribution and management schemes. and how to deploy encryption techniques to secure data in transit across d ecurity applications in the field of Information Technology.	ity, and ata netw	orks.
UNIT - I Intro	oduction		12
Introduction: The Services – A model	e OSI Security Architecture – Security Attacks – Security Mechani l for network security.	sms – S	ecurity
UNIT - II Class	sical Encryption Techniques		12
Classical Encrypt Monoalphabetic c Steganography.	ion Techniques: Symmetric cipher model – Substitution Techniques: Gipher – Playfair cipher – Polyalphabetic Cipher – Transposition	Caesar C technic	ipher – ques –
UNIT - III Bloc	k Cipher and DES		12
Block Cipher and algorithm.	d DES: Block Cipher Principles – DES – The Strength of DES – I	RSA: Th	e RSA
UNIT - IV Netw	ork Security Practices, Web Security		12
Network Security Web Security: Sec	Practices: IP Security overview – IP Security architecture – Authent cure Socket Layer and Transport Layer Security – Secure Electronic Transport	ication I saction.	Header.
UNIT - V Intru	ıders		12
Intruders – Malicio	us Software – Firewalls.		

BOOKS FOR STUDY:

William Stallings, Cryptography and Network Security Principles and Practices.

BOOKS FOR REFERENCES:

- Behrouz A. Forouzan, *Cryptography and Network Security*, Tata McGraw-Hill, 2007.
- > Atul Kahate, *Cryptography and Network Security*, Second Edition, 2003, TMH.
- M.V. Arun Kumar, *Network Security*, 2011, First Edition, USP.

WEB RESOURCES:

- https://www.tutorialspoint.com/cryptography/
- https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography
- https://www.tutorialspoint.com/cryptography/index.htm

Nature of Course	EMPLOYABILITY			~	SK	XILL ORIE	ENTED		ENTREPRENEURSHIP		>	
Curriculum Relevance	LOCAL REGION			IONAL	,	NATIONAL				GLOBAL		\checkmark
Changes Made in the Course	Percentag	Percentage of Change				No Chang	ges Made			New Course		√
* Treat	20% 05 00	oh uni	F (20*5_	.100%)	ond	l colculat	o the nerver	togo	of abone	to for the cour	CO	

Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.

COURS	SE OUTC	OMES:							I	K LEVEL	
After stu	After studying this course, the students will be able to:										
CO1	Analyze the security	ne vulnerab olution.	ilities in a	ny comput	ing system	and hence	be able to	design a]	K1 to K4	
CO2	Apply the	different cr	ryptograph	ic operation	ons of symr	netric cryp	otographic	algorithn	ns.	K1 to K4	
CO3	Apply the	different cr	ryptograph	ic operatio	ons of publi	c key cryp	tography.]	K1 to K4	
CO4	Apply the various authentication schemes to simulate different applications. K1 to										
CO5	Understan	Understand various security practices and system security standards. K1 to K4									
MAPPI	NG WITH	I PROGR	AM OUT	COMES:							
CO/PC	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	S	S	S	S	S	Μ	Μ	М	L	
CO2	S	S	S	S	S	S	Μ	L	М	Μ	
CO3	S	S	S	S	S	S	L	Μ	Μ	Μ	
CO4	S	S	S	S	S	S	Μ	Μ	L	Μ	
CO5	S	S	S	S	S	S	Μ	L	Μ	Μ	
\$	S- STRONG M – MEDIUM L - LOW										
CO / P	O MAPP	ING:									
C	os	PSO1	.]	PSO2	PSO3		PSO4		PSO5	PSO6	
C	D 1	3		3	1		2		3	2	
C) 2	3		2	3		2		3	3	
C	03	2		3	2		2		2	1	
C	04	2		3	3		1		2	3	
C	05	3		2	3		3		3	3	
WEIG	HTAGE 13			13	12	2	10		13	12	
WEIG PERCE OF CO CONTR N TO	HTED INTAGE DURSE IBUTIO POS	87		87	80		67		87	80	

LESSON PLAN:									
UNIT	Cryptography	HRS	PEDAGOGY						
I	Introduction: The OSI Security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network security.	12	Black Board/PPT						
п	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Playfair cipher – Polyalphabetic Cipher – Transposition techniques – Steganography.	12	Black Board/PPT						
III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.	12	Black Board/PPT						
IV	Network Security Practices: IP Security overview – IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.	12	Black Board/PPT						
v	Intruders – Malicious Software – Firewalls.	12	Black Board/PPT						

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Internal Cos	G		Section	n A Ds	Section B	Section C				
	K Level	No. of. Questions	K - Level	Either or Choice	Either or Choice					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)				
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)				
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)				
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4				
		No. of Questions to be answered	4		2	2				
		Marks for each question	1		5	8				
		Total Marks for each section	4		10	16				

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
CIA	K1	2			2	3.6	7.2				
	K2	2			2	3.6	1.4				
	K3		20		20	35.7	35.7				
	K4			32	32	57.1	57.1				
-	Marks	4	20	32	56	100	100				
	K1	2			2	3.6	7 0				
CIA	K2	2			2	3.6	7.2				
	K3		20		20	35.7	35.7				
II	K4			32	32	57.1	57.1				
	Marks	4	20	32	56	100	100				

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of	V Loval	Choice) With	Choice) With				
			Questions	K – Level	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Qu	uestions to	be Asked	10		10	10				
No. of Questions to be answered			10		5	5				
Marks for each question			1		5	8				
Total Marks for each section			10		25	40				
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)				

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5			5	3.57	3.57					
K2	5			5	3.57	3.57					
K3		50		50	35.72	35.72					
K4			80	80	57.14	57.14					
Marks	10	50	80	140	100	100					
ND. Higher ler	al of nonform	man of the stu	donta ia to ho	agaggad I	by attamptin	a higher level of V					

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

	Summative	Examinations -	Question	Paper –	Format
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Q. No.	Unit	CO	K-level					
Answer A	ALL the que	stions	PART – A	(10 x 1 = 10 Marks)				
	Unit - I	CO1	K1					
1.				a)	b)			
				c)	d)			
	Unit - I	CO1	K2					
2.				a)	b)			
				c)	d)			
	Unit - II	CO2	K1					
3.				a)	b)			
				c)	d)			
	Unit - II	CO2	K2					
4.				a)	b)			
				c)	d)			
	Unit - III	CO3	K1					
5.				a)	b)			
				c)	d)			
	Unit - III	CO3	K2					
6.				a)	b)			
				c)	d)			
	Unit - IV	CO4	K1					
7.				a)	b)			
				c)	d)			
	Unit - IV	CO4	K2					
8.				a)	b)			
				c)	d)			
	Unit - V	CO5	K1					
9.				a)	b)			
				c)	d)			
	Unit - V	CO5	K2					
10.				a)	b)			
				c)	d)			

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)				
11. a)	Unit - I	CO1	K3					
				OR				
11. b)	Unit - I	CO1	K3					
12. a)	Unit - II	CO2	K3					
				OR				
12. b)	Unit - II	CO2	K3					
13. a)	Unit - III	CO3	K3					
	OR							
13. b)	Unit - III	CO3	K3					
14. a)	Unit - IV	CO4	K3					
				OR				
14. b)	Unit - IV	CO4	K3					
15. a)	Unit - V	CO5	K3					
				OR				
15. b)	Unit - V	CO5	K3					

Answer ALL the questions			PART –	C (5 x 8 = 40 Marks)				
16. a)	Unit - I	CO1	K4					
				OR				
16. b)	Unit - I	CO1	K4					
17. a)	Unit - II	CO2	K4					
				OR				
17. b)	Unit - II	CO2	K4					
18. a)	Unit - III	CO3	K4					
	OR							
18. b)	Unit - III	CO3	K4					
19. a)	Unit - IV	CO4	K4					
				OR				
19. b)	Unit - IV	CO4	K4					
20. a)	Unit - V	CO5	K4					
				OR				
20. b)	Unit - V	CO5	K4					

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Analytics for Service Industry							
Course Code	23UCAEC65	L	Р	С				
Category	Elective	5	-	3				
COURSE OBJECTIVES:								

- > Recognize challenges in dealing with datasets in the service industry.
- Identify and apply appropriate algorithms for analyzing healthcare, human resource, hospitality, and tourism data.
- > Make choices for a model for new machine learning tasks.
- > Identify employees with high attrition risk.
- > Prioritize various talent management initiatives for your organization.

UNIT - I Healthcare Analytics

Healthcare Analytics : Introduction to Healthcare Data Analytics - Electronic Health Records – Components of EHR- Coding Systems - Benefits of EHR - Barrier to Adopting HER Challenges – Pheno typing Algorithms. Biomedical Image Analysis and Signal Analysis – Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.

UNIT - II Healthcare Analytics Applications

Healthcare Analytics Applications: Applications and Practical Systems for Healthcare – Data Analytics for Pervasive Health – Fraud Detection in Healthcare – Data Analytics for Pharmaceutical Discoveries – Clinical Decision Support Systems – Computer-Assisted Medical Image Analysis Systems – Mobile Imaging and Analytics for Biomedical Data.

UNIT - III HR Analytics

HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR metrics and HR analytics, Intuition versus analytical thinking, HRMS/HRIS and data sources, Analytics frameworks like LAMP, HCM:21(r) Model.

UNIT - IV Performance Analysis

Performance Analysis: Predicting employee performance, training requirements, evaluating training and development, optimizing selection and promotion decisions.

UNIT - V Tourism and Hospitality Analytics

Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics – Customer Satisfaction – Dynamic Pricing – Optimized Disruption Management – Fraud Detection in Payments.

Total Lecture Hours60

12

12

12

12

BOOKS FOR STUDY:

- > Chandan K. Reddy and Charu C. Aggarwal, *Healthcare Data Analytics*, Taylor & Francis, 2015.
- Edwards, Martin R., and Edwards, Kirsten (2016), Predictive HR Analytics: Mastering the HR Metric, Kogan Page Publishers, ISBN-0749473924.
- Fitz-enz, Jac (2010), The New HR Analytics: Predicting the Economic Value of Your Company's Human Capital Investments, AMACOM, ISBN-13: 978-0-8144-1643-3.
- Rajendra Sahu, Manoj Dash, and Anil Kumar, Applying Predictive Analytics Within the Service Sector.

BOOKS FOR REFERENCES:

- Hui Yang and Eva K. Lee, Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016.
- Fitz-enz, Jac, and Mattox II, John (2014), *Predictive Analytics for Human Resources*, Wiley, ISBN-1118940709.

WEB RESOURCES:

- https://www.ukessays.com/essays/marketing/contemporary-issues-inmarketing-marketing-essay.php
- https://yourbusiness.azcentral.com/examples-contemporary-issuesmarketing-field-26524.html
- https://www.simplilearn.com/tutorials/data-analytics-tutorial/what-is-dataanalytics

Nature of Course	EMPLOYABILITY			Sŀ	SKILL ORIENTED			ENTREPRENEURSHIP			~	
Curriculum Relevance	LOCAL		REC	IONAL			NATION	AL		GLOBAL		✓
Changes Made in the Course	Percentage of Change					No Chang	ges Made			New Course		✓
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COUR	SE OUTCOMES:	K LEVEL						
After st	After studying this course, the students will be able to:							
CO1	Understand and critically apply the concepts and methods of business analytics.	K1 to K4						
CO2	Identify, model, and solve decision problems in different settings.							
CO3	Interpret results/solutions and identify appropriate courses of action for a given managerial situation, whether a problem or an opportunity.	K1 to K4						
CO4	Create viable solutions to decision-making problems.							
CO5	Instill a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve.	K1 to K4						

MAPPI	NG WITH	I PROGR	AM	OUT	COMES:	:						
CO/PC	PO1	PO2	Р	03	PO4	PO5	PO6	PO7	PO	8	PO9	PO10
CO1	S	S	ŝ	5	S	S	S	L	Μ		Μ	M
CO2	S	S	S	5	S	S	S	M	Μ		Μ	L
CO3	S	S	٤	5	S	S	S	M	Μ		L	М
CO4	S	S	ŝ	5	S	S	S	M	L		Μ	M
CO5	S	S	5	5	S	S	S	M	Μ		Μ	L
5	S- STROI	NG				M – MEI	DIUM			I	2 - LO	W
CO / P	CO / PO MAPPING:											
C	DS	PSO1	L]	PSO2	PS	03	PSO4		PS	05	PSO6
CC) 1	3			3	3	3	3		3	3	3
CC) 2	2			3	3	3	3		3	3	3
CC) 3	3			3	2	2	3		3	3	2
CC) 4	3			3	3		3		3		3
CC	05 3 3 3				3		3		3			
WEIGH	IGHTAGE 14 15 14 1!						15		1	5	14	
WEIGHTED PERCENTAGE OF COURSE 93 CONTRIBUTIO N TO POS				100	9	3	100		100		93	
LESSO	N PLAN:											
UNIT		Ar	nalyt	ics f	or Servic	e Industr	у		HI	RS	PED	AGOGY
I Healthcare Analytics : Introduction to Healthcare Data Analytics - Electronic Health Records – Components of EHR- Coding Systems - Benefits of EHR - Barrier to Adopting HER Challenges –Phenotyping Algorithms. Biomedical Image Analysis and Signal Analysis – Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.								alytics - ystems - notyping Genomic rediction	1	2	B Boa	lack rd/PPT
 Healthcare Analytics Applications: Applications and Practical Systems for Healthcare – Data Analytics for Pervasive Health – Fraud Detection in Healthcare – Data Analytics for Pharmaceutical Discoveries – Clinical Decision Support Systems – Computer-Assisted Medical Image Analysis Systems – Mobile Imaging and Analytics for Biomedical Data. 								1	2	B Boa	lack rd/PPT	
III	 HR Analytics: Evolution of HR Analytics, HR information systems a data sources, HR metrics and HR analytics, Intuition versus analytic thinking, HRMS/HRIS and data sources. Analytics frameworks 1 									2	B Boa	lack rd/PPT

	LAMP, HCM:21(r) Model.		
IV	Performance Analysis: Predicting employee performance, training requirements, evaluating training and development, optimizing selection and promotion decisions.	12	Black Board/PPT
v	Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics – Customer Satisfaction – Dynamic Pricing – Optimized Disruption Management – Fraud Detection in Payments.	12	Black Board/PPT

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Intornal	Internal Cos	K L ovol	Section MC(n A Qs	Section B	Section C			
	K Level	No. of. Questions	K - Level	Choice	Either or Choice				
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)			
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)			
		No. of Questions to be asked	4		4	4			
Quest	tion	No. of Questions to be answered	4		2	2			
CIA I & II		Marks for each question	1		5	8			
		Total Marks for each section	4		10	16			

	Distribution of Marks with K Level CIA I & CIA II										
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %				
	K1	2			2	3.6	7.2				
	K2	2			2	3.6	1.4				
CIA	K3		20		20	35.7	35.7				
I	K4			32	32	57.1	57.1				
	Marks	4	20	32	56	100	100				
	K1	2			2	3.6	7.0				
	K2	2			2	3.6	1.2				
CIA	K3		20		20	35.7	35.7				
II	K4			32	32	57.1	57.1				
	Marks	4	20	32	56	100	100				

- K1- Remembering and recalling facts with specific answers
- K2- Basic understanding of facts and stating main ideas with general answers
- K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summativ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or				
S. No	COs	K - Level	No. of	K Lovel	Choice) With	Choice) With				
			Questions	K – Levei	K - LEVEL	K - LEVEL				
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)				
No. of Q	uestions to	be Asked	10		10	10				
No. of Que	estions to l	be answered	10		5	5				
Marks for each question		1		5	8					
Total Marks for each section			10		25	40				
	(Figu	ures in paren	thesis denotes,	questions sho	uld be asked with the give	en K level)				

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5			5	3.57	3.57					
K2	5			5	3.57	3.57					
K3		50		50	35.72	35.72					
K4			80	80	57.14	57.14					
Marks	10	50	80	140	100	100					
NB: Higher level of performance of the students is to be assessed by attempting higher level of K											
levels.											

Summative	Examinations	- (Question	Pa	per –	For	mat
			C				

Q. No.	Unit	СО	K-level		
Answer A	LL the quest	ions PA	ART – A	(10 x 1 = 10 1)	Marks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the que	estions	PART –	B (5 x 5 = 25 Marks)						
11. a)	Unit - I	CO1	K3							
	OR									
11. b)	Unit - I	CO1	K3							
12. a)	Unit - II	CO2	K3							
OR										
12. b)	Unit - II	CO2	K3							
13. a)	Unit - III	CO3	K3							
				OR						
13. b)	Unit - III	CO3	K3							
14. a)	Unit - IV	CO4	K3							
				OR						
14. b)	Unit - IV	CO4	K3							
15. a)	Unit - V	CO5	K3							
				OR						
15. b)	Unit - V	CO5	K3							

Answer A	LL the quest	ions	PART – C	C $(5 \times 8 = 40 \text{ Marks})$						
16. a)	Unit - I	CO1	K4							
				OR						
16. b)	Unit - I	CO1	K4							
17. a)	Unit - II	CO2	K4							
	OR									
17. b)	Unit - II	CO2	K4							
18. a)	Unit - III	CO3	K4							
				OR						
18. b)	Unit - III	CO3	K4							
19. a)	Unit - IV	CO4	K4							
				OR						
19. b)	Unit - IV	CO4	K4							
20. a)	Unit - V	CO5	K4							
			· · ·	OR						
20. b)	Unit - V	CO5	K4							

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Natural Language Processing			
Course Code	23UCAEC66	L	Р	С
Category	Elective	5	-	3
COURSE OBJEC	CTIVES:			
To understa	nd approaches to syntax and semantics in NLP.			
To learn nat	ural language processing and how to apply basic algorithms in this f	ield.		
To understa	nd approaches to discourse, generation, dialogue, and summarization	n with	in NLP	•
To get acqua	ainted with the algorithmic description of the main language levels:	morpł	nology,	
syntax, sem	antics, pragmatics, etc.			
To understa	nd current methods for statistical approaches to machine translation.			
UNIT - I Intro	duction			12
Introduction: Nat	ural Language Processing tasks in syntax, semantics, and prag	gmatic	s – Is	sues –
Applications – The	$role \ of \ machine \ learning - Probability \ basics - Information \ theory$	– Col	locatior	ns – N-
gram language mod	lels – Estimating parameters and smoothing – Evaluating language n	nodels	5.	
UNIT - II Word	Level Analysis, Syntactic Analysis			12
Word Level Analy	ysis: Regular expressions – Finite-state automata – Morphological	l parsi	ing – S	pelling
error detection	and correction - Words and word classes - Part-o	of-spe	ech ta	agging.
Syntactic Analysis	: Context-free grammar – Constituency parsing – Probabilistic parsi	ng.		
UNIT - III Sema	antic Analysis, Discourse Processing			12
Semantic Analysi	is: Meaning representation – Lexical semantics – Ambigui	ty –	Word	sense
disambiguation.				
Discourse Processi	ing: Cohesion – Reference resolution – Discourse coherence and stru	ucture	•	
UNIT - IV Natu	ral Language Generation, Machine Translation			12
Natural Language	Generation: Architecture of NLG systems – Generation tasks and	repres	entatior	ns —
Applications of NL	G. Machine Translation: Problems in machine translation – Charac	cterist	ics of Ir	ndian
languages – Machir	he translation approaches – Translation involving Indian languages.			
UNIT - V Infor	mation Retrieval, Lexical Resources			12
Information Retrie	eval: Design features of information retrieval systems – Classical, no	on-cla	issical, a	and
alternative models (DI INFORMATION RETRIEVAL – EVALUATION. • WordNat Frame Nat Stommers POS Tagger Descerations	oro (2010	
Lexical Kesources	worunet – Frame net – Stemmers – POS Tagger – Research corpo	ла – X	5545.	<u> </u>
	Total Locture H	011#6		

BOOKS FOR STUDY:

- > Daniel Jurafsky, James H. Martin, *Speech and Language Processing*, Pearson Publications.
- > Allen, James. *Natural Language Understanding*, Pearson, 1995.

BOOKS FOR REFERENCES:

> Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog, Springer.

WEB RESOURCES:

- https://en.wikipedia.org/wiki/Natural_language_processing.
- https://www.techtarget.com/searchenterpriseai/definition/natural-languageprocessing-NLP.
- https://www.tutorialspoint.com/natural_language_processing/index.htm

Nature of Course	EMPLC	EMPLOYABILITY			SKILL C	RII	ENTED		ENTREPRENEURSHIP		þ	
Curriculum Relevance	LOCAL		REG	IONAL	,		NATION	AL		GLOBAL		\checkmark
Changes Made in the Course	Percentag	e of Ch		No Cl	nan	ges Made			New Course		✓	
* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.												

COURS	SE OUTC	OMES:							K	LEVEL
After stu	udying this	course, th	e students	s will be a	ble to:					
CO 1	Describe the Explain the applicability	he fundame e advantag ty in differ	ental conce es and disa ent busines	epts and teo idvantages ss situatior	chniques of of differents.	f natural la nt NLP tecl	nguage pro hnologies a	ocessing. and their	K	1 to K4
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each. Use NLP technologies to explore and gain a broad understanding of text data.								1 to K4	
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyze the sentiment of a text document.									
CO4	Analyze large volume text data generated from a range of real-world applications. K1 to K4 Use NLP methods to perform topic modeling.									
CO5	 Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of Things may function, including interactions with people, enterprise functions, and environments. 									
MAPPI	NG WITH	PROGR	AM OUT	COMES:						
CO/PC	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	Μ	L	M	M
CO2	S	S	S	S	S	S	Μ	M	L	M
CO3	S	S	S	S	S	S	L	M	М	M
CO4	S	S	S	S	S	S	Μ	L	M	M
CO 5	S	S	S	S	S	S	M	M	M	L

	S- STRONG M – MEDIUM L - LOW								
CO / I	PO MAPPI	ING:							
C	os	PSO1	PSO2	PSO3	PSO4	•	PS	05	PSO6
C	01	3	3	3	3		;	3	1
C	0 2	2	3	3	3		2	2	3
C	03	1	3	3	3			1	3
C	04	3	2	1	3		2	2	3
C	05	3	3	3	3		;	3	3
WEIG	HTAGE	12	14	13	15		1	1	13
WEIC PERCI OF C CONTI N TC	GHTED ENTAGE OURSE RIBUTIO O POS	HTED NTAGE URSE 80 93 87 100 IBUTIO POS			7	3	87		
LESSC	ON PLAN:								
UNIT		Natur		HRS		PED	DAGOGY		
I Introduction: Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues – Applications – The role of machine learning – Probability basics – Information theory – Collocations – N-gram language models –							2] Boa	Black ard/PPT
п	Word Lev Morpholog Words and Syntactic Probabilis	vel Analysis: Re gical parsing – S d word classes – Analysis: Cont tic parsing.	egular expression Spelling error det Part-of-speech t ext-free gramma	ns – Finite-state auto action and correction agging. r – Constituency pa	omata — on — ırsing —	1:	2] Boa	Black ard/PPT
III	IIISemantic Analysis: Meaning representation – Lexical semantics – Ambiguity – Word sense disambiguation. Discourse Processing: Cohesion – Reference resolution – Discourse12Black Board/PP1						Black ard/PPT		
IV	Natural Language Generation: Architecture of NLG systems – Generation tasks and representations – Applications of NLG.12Black Board/PPTIVMachine Translation: Problems in machine translation – Characteristics of Indian languages – Machine translation approaches – Translation involving Indian languages.12Black Board/PPT						Black ard/PPT		
v	Information Retrieval: Design features of information retrieval12Black Board/PPT								

systems – Classical, non-classical, and alternative models of	
information retrieval – Evaluation.	
Lexical Resources: WordNet – FrameNet – Stemmers – POS Tagger –	
Research corpora – SSAS.	

	Learning Outcome Based Education & Assessment (LOBE)								
	Formative Examination - Blue Print Articulation Manning – K Levels with Course Outcomes (COs)								
	1	in treatment of the pring	Section	n A)			
Intornal	Internal Cos	W L aval	MCQ)s	Section B	Section C			
Internal Cos	K Level	No. of.	K -	Choice	Either or Choice				
			Questions	Level					
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)			
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)			
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)			
		No. of Questions to be asked	4		4	4			
Quest	tion	No. of Questions to be answered	4		2	2			
Pattern CIA I & II		Marks for each question	1		5	8			
		Total Marks for each section	4		10	16			

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %			
	K1	2			2	3.6	7 2			
	K2	2			2	3.6	1.4			
СТА	K3		20		20	35.7	35.7			
	K4			32	32	57.1	57.1			
1	Marks	4	20	32	56	100	100			
	K1	2			2	3.6	7.2			
	K2	2			2	3.6	1.2			
CIA	K3		20		20	35.7	35.7			
II	K4			32	32	57.1	57.1			
	Marks	4	20	32	56	100	100			

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summati	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			Section A	(MCQs)	Section B (Either / or	Section C (Either / or			
S. No	COs	K - Level	No. of	K Lovel	Choice) With	Choice) With			
			Questions	K – Levei	K - LEVEL	K - LEVEL			
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)			
No. of Q	uestions to	be Asked	10		10	10			
No. of Que	estions to	be answered	10		5	5			
Marks for each question		1		5	8				
Total Marks for each section			10		25	40			
	(Figu	ires in paren	thesis denotes,	questions show	uld be asked with the give	en K level)			

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5			5	3.57	3.57		
K2	5			5	3.57	3.57		
K3		50		50	35.72	35.72		
K4			80	80	57.14	57.14		
Marks	10	50	80	140	100	100		
NB: Higher lev	vel of performa	ance of the stu	dents is to be	assessed l	ov attemptin	g higher level of K		

NB: Higher level of performance of the students is to be assessed by attempting higher level of levels.

Summative Examinations -	Question	Paper –	Format
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Q. No.	Unit	СО	K-level		
Answer A	LL the quest	tions P	ART – A	(10 x 1 = 10 N)	larks)
	Unit - I	CO1	K1		
1.				a)	b)
				c)	d)
	Unit - I	CO1	K2		
2.				a)	b)
				c)	d)
	Unit - II	CO2	K1		
3.				a)	b)
				c)	d)
	Unit - II	CO2	K2		
4.				a)	b)
				c)	d)
	Unit - III	CO3	K1		
5.				a)	b)
				c)	d)
	Unit - III	CO3	K2		
6.				a)	b)
				c)	d)
	Unit - IV	CO4	K1		
7.				a)	b)
				c)	d)
	Unit - IV	CO4	K2		
8.				a)	b)
				c)	d)
	Unit - V	CO5	K1		
9.				a)	b)
				c)	d)
	Unit - V	CO5	K2		
10.				a)	b)
				c)	d)

Answer	ALL the qu	estions	PART – B	(5 x 5 = 25 Marks)					
11. a)	Unit - I	CO1	K3						
				OR					
11. b)	Unit - I	CO1	K3						
12. a)	Unit - II	CO2	K3						
	OR								
12. b)	Unit - II	CO2	K3						
13. a)	Unit - III	CO3	K3						
				OR					
13. b)	Unit - III	CO3	K3						
14. a)	Unit - IV	CO4	K3						
				OR					
14. b)	Unit - IV	CO4	K3						
15. a)	Unit - V	CO5	K3						
				OR					
15. b)	Unit - V	CO5	K3						

Answer A	LL the ques	tions	PART –	C (5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4	
				OR
16. b)	Unit - I	CO1	K4	
17. a)	Unit - II	CO2	K4	
				OR
17. b)	Unit - II	CO2	K4	
18. a)	Unit - III	CO3	K4	
				OR
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
				OR
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K4	
	·		· · ·	OR
20. b)	Unit - V	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Cyber Forensics Lab			
Course Code	L	Р	С	
Category	Skill	-	2	2
COURSE OBJE	CTIVES:			
 To Understa To Master I To Explore To Extract a To Conduct 	and and Apply Computer Forensics Principles Deleted File Recovery Techniques Data Hiding and Extraction Techniques and Analyse EXIF Data from Image Files E Live Forensic Investigations and Evidence Restoration			
S. No. Lab	Exercise			30
 Study of Co Recover De Hide and ex Extract Exc Make the fo Restore the Extract Bro View Last A Find Last C Live Forens 	omputer Forensics and different tools used for forensic investigation eleted Files using Forensics Tools stract any text file behind an image file/ Audio file using Command F hangeable image file format (EXIF) Data from Image Files using Ex- prensic image of the hard drive using EnCase Forensics. Evidence Image using EnCase Forensics wser Artifacts Activity of Your PC onnected USB on your system (USB Forensics) sics Case Investigation using Autopsy	Promp if read	t. der Soft	ware
	Total Lecture H	lours	5	30

BOOKS FOR STUDY:

- Eoghan Casey, Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet, Academic Press, 2011.
- > Harlan Carvey, Windows Forensic Analysis Toolkit, Syngress, 2011.

BOOKS FOR REFERENCES:

- > Brian Carrier, File System Forensic Analysis, Addison-Wesley, 2005.
- Chester Wisniewski and Greg Shipley, The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory, Wiley, 2014.
- Mark M. Pollitt and Peter R. Stephenson, Handbook of Digital Forensics and Investigation, Academic Press, 2009.

WEB RESOURCES:

- https://www.forensicfocus.com/
- https://www.geeksforgeeks.org/digital-forensics-in-information-security/
- https://codehs.com/tutorial/14571

Nature of Course	EMPLOYABILITY				SKILL ORIENTED			✓	ENTRE	PRENEURSHI)	
Curriculum Relevance	LOCAL		REG	IONAL	_		NATION	AL	GLOBAL			\checkmark
Changes Made in the Course	Percentag	e of Ch	ange			No Chang	ges Made		New Course			\checkmark
* Treat	* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.											

COURS	SE OUTC	OMES:								K LEVEL				
After st	udying this	s course, tł	ne student	s will be a	ble to:									
CO1	Ability to	Conduct F	orensic Inv	vestigation	s Using Ind	lustry Tool	ls			K1 to K4				
CO2	Proficiency in Recovering and Analyzing Deleted Files K1 to K4													
CO3	Skill in Hiding and Extracting Data within Media FilesK1 to K4													
CO4	Competence in Extracting and Interpreting EXIF Metadata from Images K1 to K4													
CO5	Capability to Perform Live Forensic Investigations and Evidence Restoration													
MAPPI	PPING WITH PROGRAM OUTCOMES:													
CO/PC	D PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO													
CO1	S	S	Μ	Μ	L	S	Μ	Μ	М	Μ				
CO2	Μ	M	S	Μ	M	Μ	Μ	S	L	Μ				
CO3	S	M	Μ	S	M	Μ	L	S	М	Μ				
CO4	Μ	S	L	Μ	M	S	S	М	Μ	Μ				
CO5	S	М	S	Μ	S	L	Μ	S	М	Μ				
	S- STROI	۱G			M – MEI	DIUM			L - L	ow				
CO / P	O MAPPI	ING:												
С	os	PSO1	.]	PSO2	PS	03	PSO4		PS	805				
C	D 1	3		2	2	2	2			2				
C	02	3		2	3	8	2			2				
C	03	3		3	2		2			2				
C) 4	3		2	3	8	2			1				
C	D 5	3		2	2	2	2			2				
WEIGHTAGE 15				11	1:	2	10			9				
WEIG PERCE OF CO CONTE N TO	HTED ENTAGE DURSE EIBUTIO POS	100		73	8	D	67		ſ	50				

LESSC	ON PLAN:		
UNIT	Cyber Forensics Lab	HRS	PEDAGOGY
1	Study of Computer Forensics and different tools used for forensic investigation		
2	Recover Deleted Files using Forensics Tools		
3	Hide and extract any text file behind an image file/ Audio file using Command Prompt.		
4	Extract Exchangeable image file format (EXIF) Data from Image Files using Exif reader Software		-
5	Make the forensic image of the hard drive using EnCase Forensics.	30	on Hands-on
6	Restore the Evidence Image using EnCase Forensics		Training
7	Extract Browser Artifacts		
8	View Last Activity of Your PC		
9	Find Last Connected USB on your system (USB Forensics)		
10	Live Forensics Case Investigation using Autopsy		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Intern al	Cos	K Level	Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding & Implementation	Debuggin g & Output			
	CO1	K1	5							
CI	CO2	K2		5						
AI	CO3	К3			5					
	CO4	К3				5				
	CO5	K4			-		5			
	<u>.</u>	No. of Questions to be asked	2	2	2	2	2			
Quest	tion	No. of Questions to be answered	2	2	2	2	2			
CL	A	Marks for each question	2.5	2.5	2.5	2.5	2.5			
		Total Marks for each section	5	5	5	5	5			

		Distri	bution of	Marks with	n K Leve	el CIA			
	K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	Debuggi ng & Output	Total Marks	% of (Mar ks witho ut choic e)	Cons olida ted %
	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
CIA	K4					5	5	20	20
	Marks						25	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

- K3- Application oriented- Solving Problems
- K4- Examining, analyzing, presentation and make inferences with evidences

	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
S.No.	Cos	K Level	Syntax & Semantics	Progr ammi ng princi ples	Concept Applications	Coding& Implementation	Debuggin g & Output				
1	CO1	K1	15								
2	CO2	K2		15							
3	CO3	K3			15						
4	CO4	K3				15					
5	CO5	K4					15				
	1	No. of Questions to be asked	2	2	2	2	2				
Ques	tion	No. of Questions to be answered	2	2	2	2	2				
гаш	ern Marks for each question		7.5	7.5	7.5	7.5	7.5				
		Total Marks for each section	15	15	15	15	15				

	Distribution of Marks with K Level										
K Level	Syntax & Semantics	Progra mming principl es	Concept Applicati ons	Codin g	Debuggi ng & Output	Total Marks	% of (Marks without choice)	Consol idated %			
K1	15					15	20	20			
K2		15				15	20	20			
K3			15	15		30	40	40			
K4					15	15	20	20			
Marks	15	15	15	15	15	75	100	100			