

B.Sc., COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

Syllabus

Program Code: UAI

2023 - Onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with “A⁺” Grade by NAAC

PASUMALAI, MADURAI – 625 004

**MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),
MADURAI – 625 004
B.SC COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)
CURRICULUM**

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

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	Tamil / Alternative Course					
23UTAGT11	தமிழ் இலக்கிய வரலாறு - I	6	3	25	75	100
Part – II	English					
23UENGE11	General English - I	6	3	25	75	100
Part - III	Core Courses					
23UAICC11	Programming in C	5	5	25	75	100
23UAICP11	Programming in C Lab	5	5	25	75	100
Part - III	Elective Course					
23UELEA11	Digital Logic Fundamentals	4	3	25	75	100
Part IV	Non Major Elective					
23UAINM11	Fundamentals of Computers	2	2	25	75	100
Part IV	Foundation Course					
23UAIFC11	Problem Solving Techniques	2	2	25	75	100
Total		30	23	175	525	700
SECOND SEMESTER						
Part – I	Tamil / Alternative Course					
23UTAGT21	தமிழ் இலக்கிய வரலாறு – II	6	3	25	75	100
Part – II	English					
23UENGE21	General English - II	6	3	25	75	100
Part - III	Core Courses					
23UAICC21	Object Oriented Programming with C++	5	5	25	75	100
23UAICP21	Object Oriented Programming with C++ Lab	5	5	25	75	100
Part - III	Elective Course					
23UELEA21	Electronics Science	4	3	25	75	100
Part IV	Non Major Elective					
23UAINM21	Fundamentals of Information Technology	2	2	25	75	100
Part IV	Skill Enhancement course					
23UAISP21	Advanced Excel Lab	2	2	25	75	100
Total		30	23	175	525	700

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
THIRD SEMESTER						
Part – I	Tamil / Alternative course					
23UTAGT31	தமிழக வரலாறும் பண்பாடும்	6	3	25	75	100
Part – II	English					
23UENGE31	General English - III	6	3	25	75	100
Part - III	Core courses					
23UAICC31	Data Structures and Computer Algorithms	5	5	25	75	100
23UAICP31	Data Structures and Computer Algorithms Lab	5	5	25	75	100
Part - III	Elective course					
23UMTEA32	Mathematical Statistics – I	4	3	25	75	100
Part - IV	Skill Based courses					
23UAISC31	E – COMMERCE	1	1	25	75	100
23UAISP31	Web Technology Lab	2	2	25	75	100
Part - IV	Mandatory course					
23UEVSG41	Environmental Studies	1	-	-	-	-
Total		30	22	175	525	700
FOURTH SEMESTER						
Part – I	Tamil / Alternative course					
23UTAGT41	தமிழும் அறிவியலும்	6	3	25	75	100
Part – II	English					
23UENGE41	General English - IV	6	3	25	75	100
Part - III	Core courses					
23UAICC41	Java Programming	5	5	25	75	100
23UAICP41	Java Programming Lab	5	5	25	75	100
Part - III	Elective course					
23UMTEA43	Mathematical Statistics - II	4	4	25	75	100
Part - IV	Skill Based courses					
23UAISC41	Biometrics	1	1	25	75	100
23UAISP41	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	Title of the Course	Hrs	Cred its	Maximum Marks		
				Int	Ext	Total
FIFTH SEMESTER						
Part - III	Core courses					
23UAICC51	Relational Database Management System	5	4	25	75	100
23UAICC52	Artificial Intelligence	5	4	25	75	100
23UAICP51	RDBMS Lab using ORACLE	5	4	25	75	100
Part - III	Core project					
23UAIPR51	Project with Viva - Voce	5	4	25	75	100
Part - III	Elective courses - I					
23UAIEC51	Software Engineering	4	3	25	75	100
23UAIEC52	Computer Networks					
23UAIEC53	Artificial Neural Networks					
Part - III	Elective courses - II					
23UAIEC54	Financial Analytics	4	3	25	75	100
23UAIEC55	Cryptography					
23UAIEC56	Agile Project Management					
Part - IV	Mandatory course					
23UVLEG51	Value Education	2	2	25	75	100
23UAIIN51	Summer Internship	-	2	25	75	100
Total		30	26	200	600	800
SIXTH SEMESTER						
Part - III	Core courses					
23UAICC61	Machine Learning	6	4	25	75	100
23UAICC62	IoT and Cloud Technologies	6	4	25	75	100
23UAICP61	Machine Learning Lab	6	4	25	75	100
Part - III	Elective courses - I					
23UAIEC61	Data Mining and Warehousing	5	3	25	75	100
23UAIEC62	Software Testing					
23UAIEC63	Marketing Analytics					
Part - III	Elective courses - II					
23UAIEC64	Robotics and its Applications	5	3	25	75	100
23UAIEC65	Pattern Recognition					
23UAIEC66	Cyber Forensics					
Part - IV	Skill course					
23UAISP61	Data Mining and Warehousing Lab	2	2	25	75	100
Part - V	Extension activities					
23UNCET61, 23UNSET61, 23UPEET61, 23URRET61, 23UYRET61, 23UHFET61, 23UEOET61 & 23UHRET61	N.C.C, N.S.S, Physical Education, R.R.C, Y.R.C, Health and Fitness Club, ECO Club & Human Rights Club	-	1	25	75	100
Total		30	21	175	525	700
Grand total		180	140	1100	3300	4400

FIFTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Relational Database Management System			
Course Code	23UAICC51	L	P	C
Category	Core	5	-	4

COURSE OBJECTIVES:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models.
- To understand and use data manipulation language to query, update, and manage a Database.
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

UNIT - I INTRODUCTION

15

Database System-Characteristics of Database Management Systems- Architecture of Database Management Systems-Database Models-System Development Life Cycle-Entity Relationship Model.

UNIT - II RELATIONAL DATABASE MODEL

15

Structure of Relational Model-Types of keys. Relational Algebra: Unary operations-Set operations-Join operations. Normalization: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form.

UNIT - III SQL

15

Introduction to Data Definition Language (DDL): CREATE, ALTER, DROP, RENAME, and TRUNCATE statements-Data Manipulation Language (DML): INSERT, UPDATE, and DELETE statements- Data Retrieval Language (DRL): SELECT statement-Transaction Control Language (TCL): COMMIT, ROLLBACK, and SAVEPOINT statements-Single Row Functions using DUAL: Date, Numeric, and Character functions- Group/Aggregate Functions: COUNT, MAX, MIN, AVG, and SUM functions-Set Functions: UNION, UNION ALL, INTERSECT, and MINUS-Sub query: Scalar, Multiple, and Correlated subquery- Joins: INNER and OUTER joins-Defining Constraints: PRIMARY KEY, FOREIGN KEY, UNIQUE, CHECK, and NOT NULL

UNIT - IV PL/SQL

15

Introduction to PL/SQL, PL/SQL Basics – Character Set in PL/SQL-PL/SQL Structure-SQL Cursors-Subprograms- Functions - Procedures.

UNIT - V EXCEPTION HANDLING

15

Introduction - Predefined Exceptions-User-Defined Exceptions-Triggers-Implicit and Explicit Cursors-Loops in Explicit Cursor.

Total Lecture Hours**75**

BOOKS FOR STUDY:

- Pranab Kumar Das Gupta and P. Radha Krishna, Database Management System Oracle SQL and PL/SQL, Second Edition, 2013, PHI Learning Private Limited

BOOKS FOR REFERENCES:

- RamezElmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Seventh Edition, 2017, Pearson Publications.
- Abraham Silberschatz, Henry Korth, S. Sudarshan, Database System Concepts, Seventh Edition, TMH.

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc21_cs04/preview
- ❖ <https://www.oracle.com/in/database/>
- ❖ <https://www.javatpoint.com/dbms-tutorial>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL			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.									

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Mode	K1 to K4
CO2	To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency.	K1 to K4
CO3	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure	K1 to K4
CO4	Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures	K1 to K4
CO5	Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	-	-	-	-
CO2	S	S	S	M	S	S	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	M	S	S	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM			L - LOW				

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	2	3	3
CO 3	3	3	3	3	3	3
CO 4	2	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	15	15	14	15	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	100%	100%	93%	100%	93%

LESSON PLAN:

UNIT	Relational Database Management System	HRS	PEDAGOGY
I	Database System- Characteristics of Database Management Systems- Architecture of Database Management Systems- Database Models- System Development Life Cycle- Entity Relationship Model.	15	ICT/Chalk & Talk
II	Structure of Relational Model-Types of keys. Relational Algebra: Unary operations-Set operations-Join operations. Normalization: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form	15	ICT/Chalk & Talk
III	Introduction. Data Definition Language: Create, alter, drop, rename and truncate statements-Data Manipulation Language: Insert, Update and Delete Statements-Data Retrieval Language: Select statement- Transaction Control Language: Commit, Rollback and Save point statements-Single row functions using dual- Date, Numeric and Character functions- Group/Aggregate functions: count, max, min, avg and sum functions-Set Functions: Union, union all, intersect and minus- Subquery: Scalar, Multiple and Correlated subquery-Joins: Inner and Outer joins- Defining Constraints: Primary Key, Foreign Key, Unique, Check, Not Null.	15	ICT/Chalk & Talk
IV	Introduction-PL/SQL Basic-Character Set PL/SQL Structure-SQL Cursor-Subprograms-Functions Procedures	15	ICT/Chalk & Talk

V	Introduction-Predefined Exception User Defined Exception-Triggers-Implicit and Explicit Cursors-Loops in Explicit Cursor.	15	ICT/Chalk & Talk
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Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2 (K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2 (K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2 (K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2 (K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Artificial Intelligence			
Course Code	23UAICC52	L	P	C
Category	Core	5	-	4

COURSE OBJECTIVES:

- To describe the concepts of Artificial Intelligence.
- To understand the method of solving problems using Artificial Intelligence.
- To understand natural language processing.
- To introduce the concept of Expert system, Fuzzy logic.
- To understand about operating system and their uses.

UNIT - I Introduction to Artificial Intelligence 15

What is Artificial Intelligence?: AI Technique-Problems, Problem spaces, and Search: Defining the problem as State space search- production systems- Problem characteristics- Production System characteristics-Issues in the design of search programs- Heuristic Search Techniques :Generate & Test ,Hill Climbing, Best First search, Problem reduction, Constraint satisfaction, Means-End Analysis

UNIT - II Knowledge Representation 15

Knowledge Representation Issues: Approaches and issues in knowledge representation –Using Predicate Logic: Representing simple facts in logic– Representing Instance and ISA relationship – Computable functions and predicates – Resolution – Natural deduction - Representing knowledge Using Rules: Procedural versus declarative knowledge – Logic programming - Forward versus backward reasoning – Matching – Control Knowledge – Symbolic reasoning under Uncertainty: Logics for Non-monotonic reasoning – Implementation Issues – Augmenting a problem solver – Implementation: Depth first search, Breadth first search

UNIT - III Statistical Reasoning 15

Statistical Reasoning: Probability and Bayes' Theorem - Certainty factors and rule-based systems-Bayesian networks – Dempster - Shafer Theory -Weak Slot-filler structure: Semantic nets - frames-Strong slot-filler structure: Conceptual dependency – Scripts – CYC

UNIT - IV Game Playing, Planning & NLP 15

Game Playing: Minimax search procedure-Adding alpha-beta Cutoffs- Additional Refinements – Iterative Deepening-Reference on specific games -Planning: Components of a Planning system– Goal stack planning – Nonlinear planning using constraint posting-Hierarchical planning – Reactive systems. Natural Language Processing: Syntactic Analysis, Semantic Analysis, Discourse and Pragmatic Processing– Statistical Natural Language processing

UNIT - V Learning & Advanced Topics in AI 15

What is learning? – Rote learning –Learning by taking advice – Learning in problem solving – Learning from examples: Induction – Explanation based learning – Discovery – Analogy –Formal learning theory - Neural Net learning and Genetic learning – Expert System: Representation-Expert System shells-Knowledge Acquisition. Fuzzy logic system: Crisp sets.

Total Lecture Hours	75
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BOOKS FOR STUDY:

- Elaine Rich, Kevin Knight Shivashankar B Nair, Artificial Intelligence, Third Edition, 2017, Tata McGraw Hill

BOOKS FOR REFERENCES:

- Russel S, Norvig P (2010), Artificial Intelligence: A Modern approach, Third Edition, Pearson Education
- Dan W Patterson (2007), Introduction to Artificial Intelligence and Expert System, Second Edition, Pearson Education Inc.
- Jones M(2006), Artificial Intelligence application Programming, Second Edition, Dreamtech Press
- Nilsson (2000), Artificial Intelligence: A new synthesis, Nils J Harcourt Asia PTE Ltd.

WEB RESOURCES:

- ❖ <https://www.ibm.com/think/topics/artificial-intelligence>
- ❖ <https://www.britannica.com/technology/artificial-intelligence>
- ❖ <https://www.nist.gov/artificial-intelligence>

Nature of Course	EMPLOYABILITY			SKILL ORIENTED			ENTREPRENEURSHIP		✓
Curriculum Relevance	LOCAL		REGIONAL		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.									

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Design user interfaces to improve human–AI interaction and real-time decision-making. Evaluate the advantages, disadvantages, challenges, and ramifications of human–AI augmentation.	K1 to K4
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	K1 to K4
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	K1 to K4
CO4	Extract information from text automatically using concepts and methods from natural language processing (NLP), including stemming, n-grams, POS tagging, and parsing	K1 to K4
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.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	-	-	-	-
CO2	S	M	S	S	S	S	-	-	-	-
CO3	S	S	M	S	S	S	-	-	-	-
CO4	S	S	S	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	3	2	3	3	3	3
CO 3	3	3	2	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	14	14	15	15	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	93%	100%	100%	100%

LESSON PLAN:

UNIT	Artificial Intelligence	HRS	PEDAGOGY
I	Introduction to Artificial Intelligence: What is Artificial Intelligence?:AI Technique-Problems, Problem spaces, and Search: Defining the problem as State space search- production systems- Problem characteristics- Production System characteristics–Issues in the design of search programs- Heuristic Search Techniques :Generate & Test ,Hill Climbing, Best First search, Problem reduction, Constraint satisfaction, Means-End Analysis	15	ICT/Chalk & Talk
II	Knowledge Representation:Knowledge Representation Issues: Approaches and issues in knowledge representation –Using Predicate Logic: Representing simple facts in logic– Representing Instance and ISA relationship – Computable functions and predicates – Resolution – Natural deduction - Representing knowledge Using Rules: Procedural versus declarative knowledge – Logic programming - Forward versus backward reasoning – Matching – Control Knowledge – Symbolic reasoning under Uncertainty: Logics for Non-monotonic reasoning – Implementation Issues – Augmenting a problem solver – Implementation: Depth first search, Breadth first search	15	ICT/Chalk & Talk

III	Statistical Reasoning: Statistical Reasoning: Probability and Bayes' Theorem - Certainty factors and rule-based systems- Bayesian networks – Dempster - Shafer Theory -Weak Slot-filler structure: Semantic nets - frames-Strong slot-filler structure: Conceptual dependency – Scripts – CYC	15	ICT/Chalk & Talk
IV	Game Playing, Planning & NLP: Minimax search procedure-Adding alpha-beta Cutoffs- Additional Refinements – Iterative Deepening– Reference on specific games -Planning: Components of a Planning system– Goal stack planning – Nonlinear planning using constraint posting-Hierarchical planning – Reactive systems. Natural Language Processing: Syntactic Analysis, Semantic Analysis, Discourse and Pragmatic Processing– Statistical Natural Language processing	15	ICT/Chalk & Talk
V	Learning & Advanced Topics in AI: What is learning? – Rote learning – Learning by taking advice – Learning in problem solving – Learning from examples: Induction – Explanation based learning – Discovery – Analogy – Formal learning theory - Neural Net learning and Genetic learning - Expert System: Representation-Expert System shells- Knowledge Acquisition. Fuzzy logic system Crisp sets .	15	ICT/Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	RDBMS Lab Using ORACLE			
Course Code	23UAICP51	L	P	C
Category	Core Practical	-	5	4
COURSE OBJECTIVES: ➤ To explain basic database concepts, applications, data models, schemas and instances. ➤ To demonstrate the use of constraints and relational algebra operations. ➤ To describe the basics of SQL and construct queries using SQL. ➤ To emphasize the importance of normalization in databases. ➤ To facilitate students in Database design.				
S. No.	LAB EXERCISE			75
SQL: 1. DDL commands. 2. Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null. 3. DML commands. 4. Set Operations. 5. Joins. 6. Sub-queries.				
PL/SQL: 7. Control Constructs. 8. Exception Handlers. 9. Implicit Cursor. 10. Explicit Cursor. 11. Procedures. 12. Functions. 13. Triggers. 14. TCL Commands usage (Commit, Rollback, Save point)				
TOTAL HOURS				75

BOOKS FOR STUDY:

- Pranab Kumar Das Gupta and P. Radha Krishnan, Database Management System Oracle SQL and PL/SQL, Second Edition, 2013, PHI Learning Private Limited.

BOOKS FOR REFERENCES:

- C. J. Date, A. Kannan and S. Swamynathan, *An Introduction to Database Systems*, Pearson Education, Eighth Edition, 2009.
- Abraham Silberschatz, Henry F. Korth and S. Sudarshan, *Database System Concepts*, McGraw-Hill Education (Asia), Fifth Edition, 2006.
- Shio Kumar Singh, *Database Systems Concepts, Designs and Application*, Pearson Education, Second Edition, 2011.
- Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Thomson Learning-Course Technology, Seventh Edition, 2007.

WEB RESOURCES:

- ❖ <https://www.guvi.in/courses/database-and-cloud-computing/mysql/>
- ❖ <https://www.coursera.org/learn/database-management>
- ❖ <https://www.edx.org/masters/micromasters/umbc-database-management-systems>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model.	K1 to K4
CO2	To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency.	K1 to K4
CO3	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure.	K1 to K4
CO4	Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures.	K1 to K4
CO5	Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors.	K1 to K4

Mapping with Program Outcomes:													
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	S	S	S	S	M	-	-	-	-			
CO2	S	S	S	M	S	S	-	-	-	-			
CO3	S	S	S	S	S	S	-	-	-	-			
CO4	M	S	S	S	S	S	-	-	-	-			
CO5	S	S	S	S	S	S	-	-	-	-			
S- STRONG			M – MEDIUM					L - LOW					
CO / PO Mapping:													
COS		PSO1		PSO2		PSO3		PSO4		PSO5		PSO6	
CO 1		3		3		3		3		3		2	
CO 2		3		3		3		2		3		3	
CO 3		3		3		3		3		3		3	
CO 4		2		3		3		3		3		3	
CO 5		3		3		3		3		3		3	
WEIGHTAGE		14		15		15		14		15		14	
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS		93%		100%		100%		93%		100%		93%	
Lesson Plan:													
UNIT	RDBMS Lab Using ORACLE							HRS	PEDAGOGY				
1	DDL commands.							75	Demonstration , Hands-on Training				
2	Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null												
3	DML commands												
4	Set Operations												
5	Joins												
6	Sub-queries												
7	Control Constructs												
8	Exception Handlers												
9	Implicit Cursor												
10	Explicit Cursor												

11	Procedures		
12	Functions		
13	Triggers		
14	TCL Commands usage (Commit, Rollback, Save point)		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	COs	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CI AI	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA		No. of Questions to be asked	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		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	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
	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	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
1	CO1	K1	15				
2	CO2	K2		15			
3	CO3	K3			15		
4	CO4	K3				15	
5	CO5	K4					15
Question Pattern		No. of Questions to be asked	2	2	2	2	2
		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

Distribution of Marks with K Level								
K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15			15	20	20
K4				15		15	20	20
K5					15	15	20	20
Marks						75	100	100



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Project with Viva - Voce			
Course Code	23UAIPR51	L	P	C
Category	Core	-	5	4

COURSE OBJECTIVES:

- To apply theoretical concepts and principles learned in other courses to real-world problems and projects.
- To learn to apply skills and knowledge in design, coding, and testing using appropriate technological tools and procedures.
- To gain proficiency in conducting research, collecting and analysing data, and drawing meaningful conclusions.
- To communicate complex information clearly and concisely, both in written and oral formats.
- To 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		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		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.								

COURSE OUTCOMES:									K LEVEL	
After studying this course, the students will be able to:										
CO1	Identify, research, and critically analyze a relevant problem within a specific domain.									K1 to K4
CO2	Identify various Tools to be applied to a specific Problem									K1 to K4
CO3	Apply relevant knowledge and skills to develop a feasible solution to the research problem.									K1 to K4
CO4	Develop and present a clear, concise, and well-structured project report.									K1 to K4
CO5	Develop a strong understanding of the importance of teamwork and collaboration in research projects.									K1 to K4
MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	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- STRONG			M – MEDIUM					L - LOW		

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
C01	3	2	3	3	3	3
C02	3	3	3	3	3	2
C03	3	3	3	3	3	3
C04	3	2	3	3	3	3
C05	3	3	3	3	2	3
WEIGHTAGE	15	13	15	15	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	87%	93%	100%	93%	93%



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Software Engineering			
Course Code	23UAIEC51	L	P	C
Category	Elective	4	-	3
COURSE OBJECTIVES:				
➤ Knowledge of basic SW engineering methods and practices, and their appropriate application. ➤ To understand of software requirements and the SRS documents. ➤ To provide an idea of using various process models in the software industry according to given circumstances. ➤ To Perform Testing at various levels and produce an efficient system. ➤ To describe software measurement and software risks.				
UNIT-I	Introduction			12
The Software Engineering Discipline-Programs vs. Software Products-Why Study Software Engineering- Emergence of Software Engineering-Notable Changes in Software Development Practices- and Computer Systems Engineering.				
UNIT - II	Requirements Analysis and Specification			12
Requirements Gathering and Analysis- Software Requirements Specification (SRS)-Software Design: Good Software Design-Cohesion and Coupling-Neat Arrangement-Software Design Approaches- Object-Oriented vs. Function-Oriented Design.				
UNIT - III	Function-Oriented Software Design			12
Overview of SA/SD Methodology- Structured Analysis-Data Flow Diagrams (DFDs)- Structured Design, and Detailed Design				
UNIT - IV	Coding and Testing:			12
Coding-Code Review-Testing, Testing in the Large vs. Testing in the Small-Unit Testing-Black-Box Testing-White-Box Testing-Debugging-Program Analysis Tools-Integration Testing-System Testing, and Some General Issues Associated with Testing.				
UNIT - V	Software Maintenance			12
Characteristics of Software Maintenance-Software Reverse Engineering- Software Maintenance Process Models, and Estimation of Maintenance Costs				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018

BOOKS FOR REFERENCES:

- Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
- Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
- James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

WEB RESOURCES:

- ❖ <https://www.coursera.org/articles/software-engineer>
- ❖ <https://www.geeksforgeeks.org/software-engineering/?ref=ghm>
- ❖ <https://www.edx.org/learn/software-engineering>

Nature of Course	EMPLOYABILITY			SKILL ORIENTED			ENTREPRENEURSHIP			✓
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Gain basic knowledge of analysis and design of systems	K1 to K4
CO2	Ability to apply software engineering principles and techniques	K1 to K4
CO3	Model a reliable and cost-effective software system	K1 to K4
CO4	Ability to design an effective model of the system	K1 to K4
CO5	Perform Testing at various levels and produce an efficient system.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	-	-	-	-
CO2	M	M	S	M	S	S	-	-	-	-
CO3	S	S	S	M	S	S	-	-	-	-
CO4	M	S	S	S	M	S	-	-	-	-
CO5	S	M	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	3	2
CO 2	2	2	3	2	3	3
CO 3	3	3	3	2	3	3
CO 4	2	3	3	3	2	3
CO 5	3	2	3	3	3	3
WEIGHTAGE	13	13	15	12	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	87%	87%	100%	80%	93	93%

LESSON PLAN:

UNIT	Software Engineering	HRS	PEDAGOGY
I	Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering.	12	ICT/Chalk & Talk
II	Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS) Software Design: Good software design, cohesion and coupling, neat arrangement, software design approaches, object- oriented vs function-oriented design	12	ICT/Chalk & Talk
III	Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.	12	ICT/Chalk & Talk
IV	Coding-Code Review-Testing, Testing in the Large vs. Testing in the Small-Unit Testing-Black-Box Testing-White-Box Testing-Debugging-Program Analysis Tools-Integration Testing-System Testing, and Some General Issues Associated with Testing.	12	ICT/Chalk & Talk
V	Software Maintenance: Characteristic of software maintenance-software reverse engineering- software maintenance process models-estimation of maintenance cost.	12	ICT/Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Computer Networks			
Course Code	23UAIEC52	L	P	C
Category	Elective	4	-	3
COURSE OBJECTIVES: ➤ To make students understand the concepts of Network hardware and Network Software. ➤ To analyze different network models. ➤ To impart knowledge on Design Issues of Data Link Layer. ➤ To impart knowledge on IP Addresses and Routing algorithm. ➤ To make the students understand the establishment of Network connection.				
UNIT - I Introduction:				12
Introduction – Uses of Computer Networks – Network Hardware- Network Software- OSI Reference Model – TCP/IP Reference Model.				
UNIT - II Physical Layer:				12
Physical Layer – Guided Transmission media – Wireless Transmission – Public Switched Telephone Network – Local Loop – Trunks – Multiplexing- Switching				
UNIT - III Data Link Layer:				12
Data Link Layer – Design Issues- Error Detection and Correction- Simplex Stop and Wait Protocol- Sliding Window Protocol.				
UNIT - IV Network Layer:				12
Network Layer – Design Issues – Routing Algorithm- IP Protocol – IP Addresses-Internet Control Protocols.				
UNIT - V Transport Layer:				12
Transport Layer: Addressing- Connection Establishment-Connection Release. Internet Transport Protocol: UDP-TCP. Application Layer: DNS- Electronic Mail-World Wide Web.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- S. Tanenbaum, Computer Networks, 6th Edition, 2022, PHI Learning Pvt. Ltd

BOOKS FOR REFERENCES:

- Stallings, Data and Computer Communications, Pearson Education 2012, 7th Edition
- B. A. Forouzan, Data Communications and Networking, Tata McGraw Hill 2007, 4th Edition.
- F. Halsall, Data Communications, Computer Networks and Open Systems, Pearson Education 2008.
- D. Bertsekas and R. Gallager, "Data Networks", PHI 2008, 2nd Edition.
- Lamarca, "Communication Networks", Tata McGraw Hill 2002.

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc22_ee61/preview
- ❖ <https://www.javatpoint.com/>
- ❖ <https://www.w3schools.com/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL			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.									

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Usage of computer networks. Describe the functions of each layer in OSI and TCP/IP model.	K1 to K4
CO2	Basics of Physical layer and apply them in real time applications. Techniques in multiplexing and switching.	K1 to K4
CO3	Design of Data link layer. Deduction of errors and correction. Flow control using protocols	K1 to K4
CO4	Design of Network layers. Generate IP address to find out the route through Routing algorithms	K1 to K4
CO5	Design of transport layer. Protocols needed for End-End delivery of packets. Role of Application layer in real time applications	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	-	-	-	-
CO2	M	S	S	S	M	S	-	-	-	-
CO3	S	S	S	S	M	M	-	-	-	-
CO4	S	S	S	S	M	S	-	-	-	-

CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			
CO / PO MAPPING:										
COS		PSO1	PSO2	PSO3		PSO4		PSO5	PSO6	
CO 1		3	3	3		3		3	3	
CO 2		2	3	3		3		2	3	
CO 3		3	3	3		3		2	2	
CO 4		3	3	3		3		2	3	
CO 5		3	3	3		3		3	3	
WEIGHTAGE		14	15	15		15		12	14	
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS		93	100	100		100		80	93	
LESSON PLAN:										
UNIT	Computer Networks						HRS	PEDAGOGY		
I	Introduction – Uses of Computer Networks – Network Hardware- Network Software- OSI Reference Model – TCP/IP Reference Model.						12	ICT/Chalk & Talk		
II	Physical Layer -Guided Transmission media – Wireless Transmission – Public Switched Telephone Network –Local Loop – Trunks – Multiplexing- Switching.						12	ICT/Chalk & Talk		
III	Data Link Layer-Design Issues- Error Detection and Correction- Simplex Stop and Wait Protocol- Sliding Window Protocol.						12	ICT/Chalk & Talk		
IV	Network Layer-Design Issues – Routing Algorithm- IP Protocol – IP Addresses-Internet Control Protocols.						12	ICT/Chalk & Talk		
V	Transport Layer-Addressing- Connection Establishment-Connection Release. Internet Transport Protocol: UDP-TCP. Application Layer: DNS- Electronic Mail-World Wide Web.						12	ICT/Chalk & Talk		

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Artificial Neural Network			
Course Code	23UAIEC53	L	P	C
Category	Elective	4	-	3
COURSE OBJECTIVES:				
➤ To know the basics of artificial neural networks, learning process. ➤ To understand about single layer and multi-layer perceptron networks. ➤ To understand building blocks of Neural Networks. ➤ To develop neural network models. ➤ To design and develop applications using neural networks.				
UNIT - I Artificial Neural Model				12
Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perceptron Learning Algorithm, Perceptron Convergence Theorem.				
UNIT - II AI Learning				12
Introduction-Error Correction Learning- Memory-Based Learning-Hebbian Learning, Competitive Learning- Boltzmann Learning- Credit Assignment Problem- Learning with and without a Teacher- Learning Tasks- Memory and Adaptation				
UNIT - III Single layer Perception				12
Introduction- Pattern Recognition-Linear Classifier- Simple Perceptron- Perceptron Learning Algorithm- Modified Perceptron Learning Algorithm-Adaptive Linear Combiner-Continuous Perceptron-Learning in Continuous Perceptron and Limitations of Perceptron.				
UNIT - IV Multi-Layer Perceptron Networks				12
Introduction- MLP with 2 Hidden Layers- Simple Layer of an MLP-Delta Learning Rule for the Output Layer-Multilayer Feedforward Neural Network with Continuous Perceptrons- Generalized Delta Learning Rule, and Backpropagation Algorithm				
UNIT - V Deep learning				12
Introduction-Neuroarchitectures and Building Blocks for Deep Learning Techniques-Deep Learning and Neocognitron-Deep Convolutional Neural Networks (CNN)- Recurrent Neural Networks (RNN)- Feature Extraction-Deep Belief Networks (DBN)-Restricted Boltzmann Machines (RBM)- Training of Deep Neural Networks (DNN), and Applications.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Satish Kumar, Neural Networks A Classroom Approach, Tata McGraw Hill Education, Second Edition, 2017
- Simon Haykins, Neural Network- A Comprehensive Foundation, Pearson Prentice Hall, 2nd Edition, 2003

BOOKS FOR REFERENCES:

- Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

WEB RESOURCES:

- ❖ <https://www.coursera.org/articles/artificial-neural-network>
- ❖ <https://www.javatpoint.com/artificial-neural-network>
- ❖ <https://developer.nvidia.com/discover/artificial-neural-network>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED		✓	ENTREPRENEURSHIP				
Curriculum Relevance	LOCAL		REGIONAL			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.												

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Understand the basics of artificial neural networks and its architecture	K1 to K4
CO2	Understand the various learning algorithms and their applications	K1 to K4
CO3	Identify the appropriate neural network model to a particular application	K1 to K4
CO4	Apply the selected neural network model to a particular application	K1 to K4
CO5	Analyze the performance of the selected neural network	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	-	-	-	-
CO2	S	M	S	M	S	S	-	-	-	-
CO3	S	S	M	M	S	S	-	-	-	-
CO4	M	S	S	S	M	S	-	-	-	-
CO5	S	M	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	3	2
CO 2	3	2	3	2	3	3
CO 3	3	3	2	2	3	3
CO 4	2	3	3	3	2	3
CO 5	3	2	3	3	3	3
WEIGHTAGE	14	13	14	12	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	86%	93%	80%	93%	93%

LESSON PLAN:

UNIT	Artificial Neural Network	HRS	PEDAGOGY
I	Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perceptron Learning Algorithm, Perceptron Convergence Theorem.	12	ICT, CHALK &TALK
II	Introduction-Error Correction Learning- Memory-Based Learning- Hebbian Learning, Competitive Learning- Boltzmann Learning- Credit Assignment Problem- Learning with and without a Teacher- Learning Tasks- Memory and Adaptation	12	ICT, CHALK &TALK
III	Introduction- Pattern Recognition-Linear Classifier- Simple Perceptron- Perceptron Learning Algorithm- Modified Perceptron Learning Algorithm-Adaptive Linear Combiner-Continuous Perceptron-Learning in Continuous Perceptron and Limitations of Perceptron.	12	ICT, CHALK &TALK
IV	Introduction- MLP with 2 Hidden Layers- Simple Layer of an MLP- Delta Learning Rule for the Output Layer-Multilayer Feedforward Neural Network with Continuous Perceptrons- Generalized Delta Learning Rule, and Backpropagation Algorithm	12	ICT, CHALK &TALK
V	Introduction-Neuroarchitectures and Building Blocks for Deep Learning Techniques-Deep Learning and Neocognitron-Deep Convolutional Neural Networks (CNN)- Recurrent Neural Networks (RNN)- Feature Extraction-Deep Belief Networks (DBN)-Restricted Boltzmann Machines (RBM)- Training of Deep Neural Networks (DNN), and Applications	12	ICT, CHALK &TALK

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Financial Analytics			
Course Code	23UAIEC54	L	P	C
Category	Elective	4	-	3
COURSE OBJECTIVES:				
➤ To analyze and model financial data. ➤ To construct and optimize asset portfolios. ➤ To evaluate and model Risk on various financial assets. ➤ To use the most powerful and sophisticated routines in R for analytical finance. ➤ To acquire logical & analytical skills in financial analytics.				
UNIT - I Financial Analytics				12
Introduction: Meaning-Importance of Financial Analytics uses-Features-Documents used in Financial Analytics: Balance Sheet, Income Statement, Cash flow statement-Elements of Financial Health: Liquidity, Leverage, Profitability. Financial Securities: Bond and Stock investments - Housing and Euro crisis - Securities Datasets and Visualization - Plotting multiple series.				
UNIT - II Descriptive Analytics				12
Data Exploration, Dimension Reduction and Data Clustering Geographical Mapping, Market Basket Analysis. Predictive Analytics, Fraud Detection, Churn Analysis, Crime Mapping, Content Analytics, Sentiment Analysis. Analyzing financial data and implement financial models. Process of Data analytics: obtaining publicly available data, refining such data, implement the models and generate typical output, Prices and individual security returns, Portfolio returns, Risks, Factor Models.				
UNIT - III Forecasting Analytics				12
Estimating Demand Curves and Optimize Price, Price Bundling, Non Linear Pricing and Price Skimming, Forecasting, Simple Regression and Correlation Multiple Regression to forecast sales. Modeling Trend and Seasonality Ratio to Moving Average Method, Winter's Method.				
UNIT - IV Business Intelligence & Tableau				12
Definition of BI – A Brief History of BI – The Architecture of BI. The origin and Drivers of BI. Successful BI Implementation – Analytics Overview – Descriptive, Predictive and Perspective Analytics. Business reporting and Visualization – components - A brief history of data visualization – Different types of charts and graphs – The emergence of data visualization and visual analytics – Performance dashboards – Dashboard design – Best practices in dashboard design – Business performance management – Balanced Scorecards – Six sigma as a performance measurement system.				
UNIT - V Visualizations				12
Using Tableau to Summarize Data, Slicing and Dicing Financial Data, Charts to Summarize Marketing Data. Functions to Summarize Data, Pricing Analytics, Risk based pricing, Fraud Detection and Prediction, Recovery Management, Loss Risk Forecasting, Risk Profiling, Portfolio Stress Testing.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Gary Koop, Analysis of Economic Data, 4th Edition, 2013, Wiley.
- David Ruppert, David S. Matteson, Statistics and Data Analysis for Financial Engineering: with R examples, 2015, Springer

BOOKS FOR REFERENCES:

- Analyzing Financial Data and Implementing Financial Models Using R, Ang Clifford, Springer.
- Microsoft Excel 2013: Data Analysis and Business Modeling, Wayne L. Winston, Microsoft Publishing

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc25_mg01/preview
- ❖ <https://www.coursera.org/courses?query=financial%20analytics>
- ❖ <https://www.infosysbpm.com/blogs/financial-services/how-is-data-analytics-used-in-finance.html>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Interpret and discuss the outputs of given financial models and create their own models.	K1 to K4
CO2	Design and create visualizations that clearly communicate financial data insights	K1 to K4
CO3	Gain essential knowledge and hands-on experience in the data analysis process, including data scraping, manipulation, and exploratory data analysis.	K1 to K4
CO4	Be prepared for more advanced applied financial modeling courses.	K1 to K4
CO5	Improve leadership, teamwork and critical thinking skills for financial decision making.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	-	-	-	-
CO2	M	S	S	S	M	S	-	-	-	-
CO3	S	S	S	S	M	M	-	-	-	-
CO4	S	S	S	S	M	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-

S- STRONG**M – MEDIUM****L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	2	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	15	15	15	12	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	99%	100%	100%	100%	80%	93%

LESSON PLAN:

UNIT	Financial Analytics	HRS	PEDAGOGY
I	Financial Analytics: Introduction: Meaning-Importance of Financial Analytics uses-Features-Documents used in Financial Analytics: Balance Sheet, Income Statement, Cash flow statement-Elements of Financial Health: Liquidity, Leverage, Profitability. Financial Securities: Bond and Stock investments - Housing and Euro crisis - Securities Datasets and Visualization - Plotting multiple series	12	ICT/Chalk & Talk
II	Data Exploration, Dimension Reduction and Data Clustering Geographical Mapping, Market Basket Analysis. Predictive Analytics, Fraud Detection, Churn Analysis, Crime Mapping, Content Analytics, Sentiment Analysis. Analyzing financial data and implement financial models. Process of Data analytics: obtaining publicly available data, refining such data, implement the models and generate typical output, Prices and individual security returns, Portfolio returns, Risks, Factor Models.	12	ICT/Chalk & Talk
III	Estimating Demand Curves and Optimize Price, Price Bundling, Non Linear Pricing and Price Skimming, Forecasting, Simple Regression and Correlation Multiple Regression to forecast sales. Modeling Trend and Seasonality Ratio to Moving Average Method, Winter's Method.	12	ICT/Chalk & Talk
IV	Definition of BI – A Brief History of BI – The Architecture of BI. The origin and Drivers of BI. Successful BI Implementation – Analytics	12	ICT/Chalk & Talk

	Overview – Descriptive, Predictive and Perspective Analytics. Business reporting and Visualization – components - A brief history of data visualization – Different types of charts and graphs – The emergence of data visualization and visual analytics – Performance dashboards – Dashboard design – Best practices in dashboard design – Business performance management – Balanced Scorecards – Six sigma as a performance measurement system.		
V	Using Tableau to Summarize Data, Slicing and Dicing Financial Data, Charts to Summarize Marketing Data. Functions to Summarize Data, Pricing Analytics, Risk based pricing, Fraud Detection and Prediction, Recovery Management, Loss Risk Forecasting, Risk Profiling, Portfolio Stress Testing.	12	ICT/Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AI	CO2	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Cryptography			
Course Code	23UAIEC55	L	P	C
Category	Elective	4	-	3
COURSE OBJECTIVES:				
➤ To understand the fundamentals of Cryptography. ➤ To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity. ➤ To understand the various key distribution and management schemes. ➤ To understand how to deploy encryption techniques to secure data in transit across data networks. ➤ To design security applications in the field of Information technology.				
UNIT - I Introduction				12
The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security				
UNIT - II Classical Encryption Techniques				12
Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography				
UNIT - III Block Cipher and DES				12
Block Cipher Principles – DES – The Strength of DES – RSA : The RSA algorithm				
UNIT - IV Network Security Practices				12
IP Security overview - IP Security architecture – Authentication Header. Web Security : Secure SocketLayer and Transport Layer Security – Secure Electronic Transaction.				
UNIT - V Intruders				12
Intruders- Malicious Software- Firewalls				
Total Lecture Hours				60

BOOKS FOR STUDY:

- William Stallings, Cryptography and Network Security Principles and Practices, Eighth Edition, 2022

BOOKS FOR REFERENCES:

- Behrouz A. Foruzan, Cryptography and Network Security, Tata McGraw-Hill, 2007.
- AtulKahate, “Cryptography and Network Security”, Second Edition, 2003, TMH.
- M.V. Arun Kumar, “Network Security”, 2011, First Edition, USP.

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc22_cs90/preview
- ❖ <https://www.geeksforgeeks.org/cryptography-tutorial/?ref=lbp>
- ❖ <https://www.nist.gov/cryptography>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED				ENTREPRENEURSHIP			✓
Curriculum Relevance	LOCAL		REGIONAL			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.												

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	K1 to K4
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	K1 to K4
CO3	Apply the different cryptographic operations of public key cryptography	K1 to K4
CO4	Apply the various Authentication schemes to simulate different applications.	K1 to K4
CO5	Understand various Security practices and System security standards	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	-	-	-	-
CO2	S	M	S	M	S	S	-	-	-	-
CO3	S	S	S	M	S	S	-	-	-	-
CO4	M	S	S	S	M	S	-	-	-	-
CO5	S	M	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	3	2
CO 2	3	2	3	2	3	3
CO 3	3	3	3	2	3	3
CO 4	2	3	3	3	2	3
CO 5	3	2	3	3	3	3
WEIGHTAGE	14	13	15	12	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	86%	100%	80%	93%	93%

LESSON PLAN:

UNIT	Cryptography	HRS	PEDAGOGY
I	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.	12	ICT/CHALK & TALK
II	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography	12	ICT/CHALK & TALK
III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.	12	ICT/CHALK & TALK
IV	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: Secure SocketLayer and Transport Layer Security – Secure Electronic Transaction.	12	ICT/CHALK & TALK
V	Intruders – Malicious software – Firewalls.	12	ICT/CHALK & TALK

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Agile Project Management			
Course Code	23UAIEC56	L	P	C
Category	Elective	4	-	3

COURSE OBJECTIVES:

- To understand the project management environment.
- To provide students with a theoretical as well as practical understanding of Agile software development practices and how small teams can apply them to creating high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To provide a detailed examination and demonstration of Agile development and testing techniques.
- To provide an understanding of the benefits and pitfalls of working in an Agile team.

UNIT - I Introduction

12

Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management. Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 12 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test. Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.

UNIT - II Being Agile

12

Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, and Extreme Programming - Summary. Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools. Agile Behaviours in Action: Establishing Agile roles – Establishing new values – Changing team philosophy.

UNIT - III Agile Planning and Execution

12

Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning. Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective. Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product deployment.

UNIT – IV Agile Management**12**

Managing Scope and Procurement: What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement. Managing Time and Cost: What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management – Managing Agile budgets. Managing Team Dynamics and Communication: What's different about Agile team dynamics – Managing Agile team dynamics – What's different about Agile communication – Managing Agile communication. Managing Quality and Risk: What's different about Agile quality – Managing Agile quality – What's different about Agile risk management – Managing Agile risk .

UNIT - V Implementing Agile**12**

Measuring External Product Attributes- Modeling Software Quality-Measuring Aspects of Quality- Usability Measures-Maintainability Measures-Security Measures- Software Reliability-Measurement and Prediction – Basics of Reliability Theory- The Software Reliability Problem-Parametric Reliability Growth Models- Predictive Accuracy for project success – Ten metrics for Agile Organizations.

Total Lecture Hours**60****BOOKS FOR STUDY:**

- Mark C. Layton, Steven J. Ostermiller, *Agile Project Management for Dummies*, 2nd Edition, Wiley India Pvt. Ltd., 2018.
- Jeff Sutherland, *Scrum: The Art of Doing Twice the Work in Half the Time*, Penguin, 2014.

BOOKS FOR REFERENCES:

- Mark C. Layton, David Morrow, *Scrum for Dummies*, 2nd Edition, Wiley India Pvt. Ltd., 2018.
- Mike Cohn, *Succeeding with Agile – Software Development using Scrum*, Addison-Wesley Signature Series, 2010.
- Alex Moore, *Agile Project Management*, 2020.
- Alex Moore, *Scrum*, 2020.
- Andrew Stellman and Jennifer Greene, *Learning Agile: Understanding Scrum, XP, Lean, and Kanban*, Shroff/O'Reilly, First Edition, 2014

WEB RESOURCES:

- ❖ <https://www.coursera.org/learn/agile-project-management>
- ❖ www.agilealliance.org/resources
- ❖ https://www.tutorialspoint.com/management_concepts/agile_project_management.htm

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP					
Curriculum Relevance	LOCAL		REGIONAL			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.**

COURSE OUTCOMES:									K LEVEL
After studying this course, the students will be able to:									
CO1	Understanding of the Agile manifesto and its advantages over other SDLC paradigms.								K1 to K4
CO2	Understanding essential Agile concepts.								K1 to K4
CO3	Understanding how to plan and execute a project using Agile concepts								K1 to K4
CO4	Understanding Agile management concepts.								K1 to K4
CO5	Practical application of Agile principles.								K1 to K4

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	-	-	-	-
CO2	S	M	S	M	S	S	-	-	-	-
CO3	S	S	S	M	S	S	-	-	-	-
CO4	S	S	S	S	M	S	-	-	-	-
CO5	S	M	S	M	S	S	-	-	-	-
S- STRONG			M – MEDIUM					L - LOW		

CO / PO MAPPING:						
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	3	2
CO 2	3	2	3	2	3	3
CO 3	3	3	3	2	3	3
CO 4	3	3	3	3	2	3
CO 5	3	2	3	2	3	3
WEIGHTAGE	15	13	15	12	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	86%	100%	80%	93%	93%

LESSON PLAN:			
UNIT	Agile Project Management	HRS	PEDAGOGY
I	Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management. Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 12 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test. Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.	12	ICT /CHALK & TALK

II	Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, and Extreme Programming - Summary. Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools. Agile Behaviours in Action: Establishing Agile roles – Establishing new values – Changing team philosophy	12	ICT /CHALK & TALK
III	Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning. Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective. Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product deployment	12	ICT /CHALK & TALK
IV	Managing Scope and Procurement: What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement. Managing Time and Cost: What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management – Managing Agile budgets. Managing Team Dynamics and Communication: What's different about Agile team dynamics – Managing Agile team dynamics – What's different about Agile communication – Managing Agile communication. Managing Quality and Risk: What's different about Agile quality – Managing Agile quality – What's different about Agile risk management – Managing Agile risk.	12	ICT /CHALK & TALK
V	Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating an environment that enables Agility – Support Agility initially and over time. Being a Change Agent: Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls – Signs your changes are slipping. Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.	12	ICT /CHALK & TALK

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Summer Internship			
Course Code	23UAIIN51	L	P	C
Category	Summer Internship	-	-	2

COURSE OBJECTIVES:

The main objectives of this course are to:

- To introduce the concepts of working ambiance, attitude, adaptability, problem-solving ability.
- Enable the students to work on short industry projects and come up with the solutions commensurate with the assigned problem to the students.
- To provide exposure to the different phases of developing a computer solution with team spirit.
- To impart skills in preparing detailed report describing the project and results/findings.
- To identify gap in existing knowledge to help develop a specialization.

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
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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		✓	SKILL ORIENTED		ENTREPRENEURSHIP	
Curriculum Relevance	LOCAL		REGIONAL		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.							

COURSE OUTCOMES:										K LEVEL
After studying this course, the students will be able to:										
CO1	Apply theoretical knowledge and skills learned in coursework to real-world situations within the internship setting.									K1 to K4
CO2	Provide opportunities to develop skills relevant to the student's field of study, such as communication, problem-solving, critical thinking, and technical skills.									K1 to K4
CO3	Describe use of advanced tools and techniques encountered during industrial training and visit.									K1 to K4
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.									K1 to K4
CO5	Enhance individual skills in communication, presentation and project organization.									K1 to K4
MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	S	M	S	S	M
CO2	M	S	S	S	M	S	S	M	S	S
CO3	S	S	M	M	S	M	S	S	S	S
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	S	S	M	S	S	S	M	M	S
S- STRONG			M – MEDIUM					L - LOW		

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
C01	3	2	3	3	3	3
C02	3	3	3	3	2	2
C03	3	3	3	3	3	3
C04	3	3	3	3	3	3
C05	3	3	3	3	2	3
WEIGHTAGE	15	14	15	15	13	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	93%	100%	87%	93%

SIXTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Machine Learning			
Course Code	23UAICC61	L	P	C
Category	Core	6	-	4
COURSE OBJECTIVES: ➤ To learn about Machine Intelligence and Machine Learning applications. ➤ To implement and apply machine learning algorithms to real-world applications. ➤ To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems. ➤ To create instant based learning. ➤ To apply advanced learning.				
UNIT - I Introduction				18
Machine Learning - Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines				
UNIT - II Neural networks and genetic algorithms				18
Neural networks and genetic algorithms Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.				
UNIT - III Bayesian and computational learning				18
Bayesian and computational learning Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.				
UNIT - IV Instant based learning				18
Instant based learning K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.				
UNIT - V Advanced learning				18
Advanced learning Recommendation systems – opinion mining, sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.				
Total Lecture Hours				90

BOOKS FOR STUDY:

- Tom M. Mitchell, Machine Learning, Tata McGraw Hill Education (India) Private Limited, 2017
- Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, "Deep learning", MIT Press, 2015

BOOKS FOR REFERENCES:

- Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004
- Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

WEB RESOURCES:

- ❖ <https://www.ibm.com/think/topics/machine-learning>
- ❖ <https://www.geeksforgeeks.org/machine-learning/>
- ❖ <https://developers.google.com/machine-learning/crash-course>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Appreciate the importance of visualization in the data analytics solution	K1 to K4
CO2	Apply structured thinking to unstructured problems	K1 to K4
CO3	Understand a very broad collection of machine learning algorithms and problems	K1 to K4
CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory	K1 to K4
CO5	Develop an appreciation for what is involved in learning from data	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	-	-	-	-
CO2	S	S	S	S	S	S	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	S	S	M	S	S	S	-	-	-	-
CO5	S	S	S	S	M	M	-	-	-	-

S- STRONG**M – MEDIUM****L – LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	2	3	3	3
CO 5	3	3	3	3	2	2
WEIGHTAGE	15	15	14	15	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	100%	93%	100	93%	93%

LESSON PLAN:

UNIT	Machine Learning	HRS	PEDAGOGY
I	Introduction Machine Learning - Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines	18	ICT / CHALK & TALK
II	Neural networks and genetic algorithms Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.	18	ICT / CHALK & TALK
III	Bayesian and computational learning Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.	18	ICT / CHALK & TALK
IV	Instant based learning K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning	18	ICT / CHALK & TALK

V	Advanced learning Recommendation systems – opinion mining, sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.	18	ICT / CHALK & TALK
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Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	IoT and Cloud Technologies			
Course Code	23UAICC62	L	P	C
Category	Core	6	-	4

COURSE OBJECTIVES:

- To learn the basic concepts of Cloud Computing and IoT.
- To get an overview of Virtual machines.
- To learn about infrastructure security, Data Security and Privacy.
- To understand access based on access management in data security.
- To generate security and privacy access for the end user.

UNIT – I IoT Introduction

18

Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU - Protocols for IoT.

UNIT - II Introduction to Cloud Computing

18

Cloud Computing – Definition – SPI Framework – Software Model – Cloud Services Delivery Model – Deployment Models – Key drivers – Impact on Users – Governance in the cloud – Barriers to Cloud Computing Adoption in the enterprise. Examples of Cloud Service Providers: Amazon Web services – Google – Microsoft Azure Services Platform – Sun Open Cloud Platform.

UNIT - III . Virtual Machines Provisioning and Migration Services

18

Introduction and Inspiration -Background and Related Work- Virtual Machines 15 50 Provisioning and Manageability-Virtual Machine Migration Services -VM Provisioning and Migration in Action - Provisioning in the Cloud Context - Future Research Directions- The Anatomy of Cloud Infrastructures - Distributed Management of Virtual Infrastructures-Scheduling Techniques for Advance Reservation of Capacity- Capacity Management to meet SLA Commitments.

UNIT - IV Data Security, Identity and Access Management Data security and storage

18

Aspects of Data Security -Data Security Mitigation -Provider Data and Its Security. Identity and Access Management: Trust Boundaries and IAM -Why IAM? - IAM Challenges- IAM Definitions-IAM Architecture and Practice-Getting Ready for the Cloud - Relevant IAM Standards and Protocols for Cloud Services - IAM Practices in the Cloud-Cloud Authorization Management- Cloud Service Provider IAM Practice.

UNIT - V Security and Privacy Security Management

18

Standards – Security Management in the Cloud – Availability Management – Access Control. Privacy: What is Privacy – Data Life Cycle – Key Privacy Concerns – Who is responsible for protecting Privacy – Privacy Risk Management – Legal and Regulatory Implications-IoT and Cloud Integration: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment.

Total Lecture Hours

90

BOOKS FOR STUDY:

- Pethuru Raj, Anupama C. Raman , "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2022
- Adrian McEwen, Designing the Internet of Things, Wiley, 2013.
- Tim Mather, SubraKumaraswamy, ShahedLatif (2010), Cloud Security and Privacy, OREILLY Media.
- Rajkumar Buyya, James Broberg, AndrzejGoscinski(2011), CLOUD COMPUTING Principles and Paradigms, John Wiley & Sons, Inc., Hoboken, New Jersey

BOOKS FOR REFERENCES:

- Ronald L. Krutz and Russell Dean Vines(2010), Cloud Security, Wiley – India

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc22_cs53/preview
- ❖ <https://www.geeksforgeeks.org/iot-and-cloud-computing/>
- ❖ <https://www.cloudpanel.io/blog/iot-and-cloud-computing/>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED			ENTREPRENEURSHIP		✓
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Design an IoT system with cloud infrastructure.	K1 to K4
CO2	Implement the M2M Communication protocols in a prototype	K1 to K4
CO3	Understand the basic concepts of the main sensors used in electromechanical systems	K1 to K4
CO4	Understand/implement computer models of common engineering information types.	K1 to K4
CO5	Understand storage mechanisms / analysis algorithms for data management in distributed & data intensive applications	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	-	-	-	-
CO2	S	S	S	S	S	S	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	S	S	S	S	M	S	-	-	-	-
CO5	S	M	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
WEIGHTAGE	15	14	15	15	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	100%	100%	93%	93%

LESSON PLAN:

UNIT	IoT and Cloud Technologies	HRS	PEDAGOGY
I	IoT Introduction: Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU - Protocols for IoT.	18	ICT/CHALK & TALK
II	Introduction to Cloud Computing Cloud Computing – Definition – SPI Framework – Software Model – Cloud Services Delivery Model – Deployment Models – Key drivers – Impact on Users – Governance in the cloud – Barriers to Cloud Computing Adoption in the enterprise. Examples of Cloud Service Providers: Amazon Web services – Google – Microsoft Azure Services Platform – Sun Open Cloud Platform	18	ICT/CHALK & TALK
III	Virtual Machines Provisioning and Migration Services Introduction and Inspiration -Background and Related Work- Virtual Machines Provisioning and Manageability-Virtual Machine Migration Services VM Provisioning and Migration in Action -Provisioning in the Cloud Context - Future Research Directions- The Anatomy of Cloud Infrastructures -Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- Capacity Management to meet SLA Commitments	18	ICT/CHALK & TALK
IV	Data Security, Identity and Access Management Data security and storage: Aspects of Data Security -Data Security Mitigation -Provider Data and Its Security. Identity and Access Management: Trust Boundaries and IAM -Why IAM? - IAM Challenges- IAM Definitions- IAM Architecture and Practice-Getting Ready for the Cloud - Relevant IAM Standards and Protocols for Cloud Services - IAM Practices in the	18	ICT/CHALK & TALK

	Cloud-Cloud Authorization Management- Cloud Service Provider IAM Practice.		
V	Security and Privacy Security Management: Standards – Security Management in the Cloud – Availability Management – Access Control. Privacy: What is Privacy – Data Life Cycle – Key Privacy Concerns – Who is responsible for protecting Privacy – Privacy Risk Management – Legal and Regulatory Implications and Cloud Integration: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment.	18	ICT/CHALK & TALK

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AI	CO2	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Machine Learning Lab			
Course Code	23UAICP61	L	P	C
Category	Core Practical	-	6	4

COURSE OBJECTIVES:

- To impart knowledge on the basic concepts underlying machine learning.
- To introduce classical and foundational concepts, results, methodologies and applications in machine learning.
- To implement basic algorithms in clustering & classification applied to text & numeric data.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To apply the algorithms to a real-world problem, optimize the models learned.

S. No.	Lab Exercise	90
1.	Solving Regression & Classification using Decision Trees	
2.	Root Node Attribute Selection for Decision Trees using Information Gain	
3.	Bayesian Inference in Gene Expression Analysis	
4.	Pattern Recognition Application using Bayesian Inference	
5.	Bagging in Classification	
6.	Bagging, Boosting applications using Regression Trees	
7.	Data & Text Classification using Neural Networks	
8.	Using Weka tool for SVM classification for chosen domain application	
9.	Data & Text Clustering using K-means algorithm	
10.	Data & Text Clustering using Gaussian Mixture Models	
Total Lecture Hours		90

BOOKS FOR STUDY:

- Tom M. Mitchell, Machine Learning, Tata McGraw Hill Education (India) Private Limited, 2014
- Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, "Deep learning", MIT Press, 2015

BOOKS FOR REFERENCES:

- Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014
- Stephen Marsland, Taylor & Francis, Machine Learning: An Algorithmic Perspective, 2009

WEB RESOURCES:

- ❖ <https://www.ibm.com/think/topics/machine-learning>
- ❖ <https://www.geeksforgeeks.org/machine-learning/>
- ❖ <https://developers.google.com/machine-learning/crash-course>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Effectively use the various machine learning tools	K1 to K4
CO2	Understand and implement the procedures for machine learning algorithms	K1 to K4
CO3	Design Python programs for various machine learning algorithms	K1 to K4
CO4	Apply appropriate datasets to the Machine Learning algorithms	K1 to K4
CO5	Analyze the graphical outcomes of learning algorithms with specific datasets	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	-	-	-	-
CO2	S	S	S	M	S	S	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	M	S	S	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	2	3	3
CO 3	3	3	3	3	3	3
CO 4	2	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	15	15	14	15	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	100%	100%	93%	100%	93%

LESSON PLAN:

UNIT	Machine Learning Lab	HRS	PEDAGOGY
1	Solving Regression & Classification using Decision Trees	90	Demonstration, Hands-on Training
2	Root Node Attribute Selection for Decision Trees using Information Gain		
3	Bayesian Inference in Gene Expression Analysis		
4	Pattern Recognition Application using Bayesian Inference		
5	Bagging in Classification		
6	Bagging, Boosting applications using Regression Trees		
7	Data & Text Classification using Neural Networks		
8	Using Weka tool for SVM classification for chosen domain application		
9	Data & Text Clustering using K-means algorithm		
10	Data & Text Clustering using Gaussian Mixture Models		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CI AI	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA		No. of Questions to be asked	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		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	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5			10	40	40
	K4				5		5	20	20
	K5					5			
	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	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
1	CO1	K1	15				
2	CO2	K2		15			
3	CO3	K3			15		
4	CO4	K3				15	
5	CO5	K4					15
Question Pattern		No. of Questions to be asked	2	2	2	2	2
		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

Distribution of Marks with K Level

K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15			15	20	20
K4				15	15	30	20	20
Marks	15	15	15	15	15	75	100	100



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Data Mining and Warehousing			
Course Code	23UAIEC61	L	P	C
Category	Elective	5	-	3
COURSE OBJECTIVES: ➤ To provide the knowledge on Data Mining and Warehousing concepts and techniques. ➤ To be familiar with the Data warehouse architecture and its Implementation. ➤ To study the basic concepts of cluster analysis. ➤ To study a set of typical clustering methodologies, algorithms and applications. ➤ To extract knowledge from data repository for data analysis, frequent pattern, classification and prediction.				
UNIT - I Introduction				15
Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction.				
UNIT - II Data Mining, Primitives, Languages and System Architecture				15
Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization.				
UNIT - III Mining Association Rules				15
Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases.				
UNIT - IV Classification and Prediction:				15
Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation.				
UNIT - V Cluster Analysis				15
Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods-Density Based Methods.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Jiawei Han , Jian Pei, Hanghang Tong, Data Mining Concepts and Techniques, Third edition, 2023, Harcourt India Pvt. Ltd, New Delhi.

BOOKS FOR REFERENCES:

- K.P. Soman, Shyam Diwakar, V. Ajay, Insight into Data Mining Theory and Practice , Prentice Hall of India Pvt. Ltd, New Delhi, 2006
- Parteek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, Cambridge University Press, 2019.

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc21_cs06/preview
- ❖ <https://www.tutorialspoint.com/data-warehousing-and-data-mining>
- ❖ <https://peliqan.io/blog/data-warehousing-and-data-mining/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP				
Curriculum Relevance	LOCAL		REGIONAL			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.											

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	To understand the basic concepts and the functionality of the various data mining and data warehousing component.	K1 to K4
CO2	To know the concepts of Data mining system architectures.	K1 to K4
CO3	To analyze the principles of association rules.	K1 to K4
CO4	To get analytical idea on Classification and prediction methods.	K1 to K4
CO5	To Gain knowledge on Cluster analysis and its methods.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	-	-	-	-
CO2	S	S	S	S	S	M	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	S	M	M	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	14	14	14	14	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	93%	93%	93%	86%

LESSON PLAN:

UNIT	Data Mining and Warehousing	HRS	PEDAGOGY
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction.	15	ICT/CHALK & TALK
II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization.	15	ICT/CHALK & TALK
III	Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases.	15	ICT/CHALK & TALK
IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation.	15	ICT/CHALK & TALK
V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods-Density Based Methods	15	ICT/CHALK & TALK

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Software Testing			
Course Code	23UAIEC62	L	P	C
Category	Elective	5	-	3
COURSE OBJECTIVES:				
➤ To understand and describe the basic concepts of functional (black box) software testing. ➤ To understand the basic application of techniques used to identify useful ideas for tests. ➤ To determine the mission and communicate the status of testing with the rest of the project team. ➤ Characterize a good bug report, peer-review the reports of the colleagues, and improve own report writing. ➤ To understand where key testing concepts apply within the context of unified processes.				
UNIT - I Introduction				15
Purpose–Productivity and Quality in Software –Testing Vs Debugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.				
UNIT - II Flow / Graphs and Path Testing				15
Flow / Graphs and Path Testing – Achievable paths– Path instrumentation –Application– Transaction Flow Testing Techniques				
UNIT - III Data Flow Testing				15
Data Flow Testing Strategies – Domain Testing: Domains and Paths –Domains and Interface Testing.				
UNIT - IV Metrics & Complexity				15
Linguistic–Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing–Formats– TestCases.				
UNIT - V Logic-Based Testing				15
Logic-Based Testing–Decision Tables– Transition Testing– States, State Graph, State Testing.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- B.Beizer, Software Testing Techniques, Second Edition, DreamTech India, New Delhi,2007.
- K.V.K.Prasad, Software Testing Tools, DreamTech.India, NewDelhi, 2005.

BOOKS FOR REFERENCES:

- Burnstein, Practical Software Testing, Springer InternationalEdn, 2003
- Kit, Software Testing in the Real World: Improving the Process, Pearson Education, 1995
- RenuRajani, Pradeep Oak, Software Testing, Tata McGrawHill, 2004

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc22_cs61/preview
- ❖ <https://www.geeksforgeeks.org/software-testing-basics/>
- ❖ <https://www.javatpoint.com/software-testing-tutorial>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Understand and describe the basic concepts of functional (black box) software testing.	K1 to K4
CO2	Understand the basic application of techniques used to identify useful ideas for tests.	K1 to K4
CO3	Help determine the mission and communicate the status of your testing with the rest of your project team.	K1 to K4
CO4	Characterize a good bug report, peer-review the reports of your colleagues, and improve your own report writing.	K1 to K4
CO5	Understand where key testing concepts apply within the context of unified processes.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	-	-	-	-
CO2	M	S	S	M	S	M	-	-	-	-
CO3	S	S	S	S	S	S	-	-	-	-
CO4	S	M	M	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	2	2	2
CO 2	2	3	3	2	3	2
CO 3	3	3	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	13	14	13	14	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	87	87	87	67	93	73

LESSON PLAN:

UNIT	Software Testing	HRS	PEDAGOGY
I	Introduction: Purpose–Productivity and Quality in Software– Testingvs Debugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.	15	ICT /Chalk & Talk
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation –Application–Transaction Flow Testing Techniques	15	ICT /Chalk & Talk
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.	15	ICT /Chalk & Talk
IV	Linguistic–Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing– Formats–Test Cases.	15	ICT /Chalk & Talk
V	Logic Based Testing – Decision Tables– Transition Testing– States, State Graph, State Testing.	15	ICT /Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Marketing Analytics			
Course Code	23UAIEC63	L	P	C
Category	Elective	5	-	3

COURSE OBJECTIVES:

- To understand the importance of marketing analytics for forward looking and systematic allocation of marketing resources.
- To know how to use marketing analytics to develop predictive marketing dashboard for organization.
- To recognize challenges in dealing with data sets in marketing.
- To identify and apply appropriate algorithms for analyzing the social media and web data.
- To make choices for a model for new machine learning tasks.

UNIT - I Marketing Analytics 15

Introduction to marketing research, Research design setup, Qualitative research, Quantitative research, Concept development, scale development, Exploring Data, Descriptive Statistics. Product analytics- features, attributes, benefits, Price analytics, Promotion analytics, Channel analytics, Multiple Discriminate analysis.

UNIT - II Customer Analytics 15

Customer Analytics, Analyzing customer satisfaction, Prospecting and Targeting the Right Customers, Covariance and Correlation analysis, Developing Customers, Retaining Customers, Customer lifetime value case, Factor analysis. Market Segmentation & Cluster Analysis, Scatterplots & Correlation Analysis, Linear Regression, Model Validation & Assessment, Positioning analytics, Cross tabulation..

UNIT - III Social Media Analytics (SMA) 15

Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas Network fundamentals and models: The social networks perspective - nodes, ties and influencers, Social network and web data and methods. Graphs and Matrices- Basic measures for individuals and networks. Information visualization.

UNIT - IV Face book Analytics 15

Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post-performance on FB. Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube Twitter etc. Google Slides, Introduction. (Websites).

UNIT - V Web Analytics and making connections 15

Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity. Web analytics tools: Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing.

Total Lecture Hours	75
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BOOKS FOR STUDY:

- Chuck Hemann & Ken Burbary, Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World, 2nd edition, 2018, Pearson
- Eric Siegel, Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, 2016, Pearson.
- Dave Jacobs, Marketing Analytics: Optimize Your Business with Data Science in R, Python, and SQL, 2016
- Matthew Ganis, Avinash Kohirkar. Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media. Pearson 2016.
- Jim Sterne, Social Media Metrics: How to Measure and Optimize Your Marketing Investment. Wiley, 2020
- Marshall Sponder. Social Media Analytics. McGraw Hill Latest edition.

BOOKS FOR REFERENCES:

- Marketing Analytics: A practical guide to real marketing science, Mike Grigsby, Kogen Page,
- Raj Kumar Venkatesan, Paul Farris, Ronald T. Wilcox., Cutting Edge Marketing Analytics: Real World Cases and Data Sets for Hands on Learning,
- Bendle, Farris, Pfefferly, Reibstein, Marketing Metrics, 3rd edition

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc20_mg30/preview
- ❖ <https://www.coursera.org/learn/uva-darden-market-analytics>
- ❖ <https://www.salesforce.com/in/marketing/analytics/guide/>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED				ENTREPRENEURSHIP			✓	
Curriculum Relevance	LOCAL		REGIONAL				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.													

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Critically evaluate the key analytical frameworks and tools used in marketing. Apply key marketing theories, frameworks and tools to solve marketing problems.	K1 to K4
CO2	Utilize information of a firm's external and internal marketing environment to identify and prioritize appropriate marketing strategies.	K1 to K4
CO3	Exercise critical judgment through engagement and reflection with existing marketing literature and new developments in the marketing environment.	K1 to K4
CO4	Critically evaluate the marketing function and the role it plays in achieving organizational success both in commercial and non-commercial settings.	K1 to K4
CO5	Evaluate and act upon the ethical and environmental concerns linked to marketing activities.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	-	-	-	-
CO2	S	S	S	S	S	M	-	-	-	-
CO3	S	M	S	S	S	S	-	-	-	-
CO4	S	M	M	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	2
CO 3	3	2	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	13	14	15	15	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	87%	93%	100%	100%	87%

LESSON PLAN:

UNIT	Marketing Analytics	HRS	PEDAGOGY
I	Marketing Analytics : Introduction to marketing research, Research design setup, Qualitative research, Quantitative research, Concept development, scale development, Exploring Data, Descriptive Statistics. Product analytics- features, attributes, benefits, Price analytics, Promotion analytics, Channel analytics, Multiple Discriminate analysis.	15	ICT/Chalk & Talk
II	Customer Analytics: Customer Analytics, Analyzing customer satisfaction, Prospecting and Targeting the Right Customers, Covariance and Correlation analysis, Developing Customers, Retaining Customers, Customer lifetime value case, Factor analysis. Market Segmentation & Cluster Analysis, Scatterplots & Correlation Analysis, Linear Regression, Model Validation & Assessment, Positioning analytics, Cross tabulation.	15	ICT/Chalk & Talk
III	Social Media Analytics (SMA) : Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas Network fundamentals and models: The social networks perspective - nodes, ties and influencers, Social network and web data and methods. Graphs and Matrices- Basic measures for individuals	15	ICT/Chalk & Talk

	and networks. Information visualization.		
IV	Facebook Analytics: Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post- performance on FB. Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. 9 (LinkedIn, Instagram, YouTube Twitter etc. Google analytics. Introduction (Websites)	15	ICT/Chalk & Talk
V	Web Analytics and making connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity. Web analytics tools: Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing.	15	ICT/Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Robotics and its Applications			
Course Code	23UAIEC64	L	P	C
Category	Elective	5	-	3
COURSE OBJECTIVES:				
➤ To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry. ➤ To provide information on various types of end effectors, their design, interfacing and selection. ➤ To make the students familiar with the various drive systems of robots, sensors and their applications in robots. ➤ To introduce the parts of robots, basic working concepts and types of robots. ➤ To familiarize the basic concepts of transformations performed by robot.				
UNIT - I Introduction				15
Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.				
UNIT - II Actuators and sensors				15
Types of actuators, stepper-DC servo-and brushless motors- model of a DC servo motor types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers.				
UNIT - III Localization				15
Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.				
UNIT - IV Path Planning				15
Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance case studies				
UNIT - V Application				15
Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space applications				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Richared D.Klafter, Thomas A.Chmielewski and Mickael Negin, Robotic Engineering an Integrated Approach, Prentice Hall India, 2011
- Saeed B.Nikku, Introduction to Robotics Analysis, Control and Applications, Wiley India, Third edition, 2019

BOOKS FOR REFERENCES:

- Industrial Robotics Technology, Programming, and Application by M.P.Groover et.al, Tata McGrawhill, 2007
- Robotics technology and flexible automation by S.R.Deb, THH-2009

WEB RESOURCES:

- ❖ <https://www.electronicsforu.com/tech-zone/tech-of-robotics/robotics-types-applications>
- ❖ <https://web.iitd.ac.in/~saha/ethiopia/appln.pdf>

Nature of Course	EMPLOYABILITY				SKILL ORIENTED				ENTREPRENEURSHIP			✓
Curriculum Relevance	LOCAL		REGIONAL			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.												

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Describe the different physical forms of robot architectures	K1 to K4
CO2	Kinematically model simple manipulator and mobile robots	K1 to K4
CO3	Mathematically describe a kinematic robot system.	K1 to K4
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	K1 to K4
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	-	-	-	-
CO2	S	S	S	S	S	M	-	-	-	-
CO3	S	M	S	S	S	S	-	-	-	-
CO4	S	M	M	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	2	2	2
CO 2	3	3	3	3	3	2
CO 3	3	2	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	12	14	14	14	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	80%	93%	93%	93%	87%

LESSON PLAN:

UNIT	Robotics and Its Applications	HRS	PEDAGOGY
I	Introduction: Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.	15	ICT /Chalk & Talk
II	Actuators and sensors : Types of actuators, stepper-DC servo-and brushless motors- model of a DC servo motor types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers	15	ICT /Chalk & Talk
III	Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.	15	ICT /Chalk & Talk
IV	Path Planning : Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance case studies	15	ICT /Chalk & Talk
V	Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space applications	15	ICT /Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Pattern Recognition			
Course Code	23UAIEC65	L	P	C
Category	Elective	5	-	3
COURSE OBJECTIVES: ➤ To study the Pattern Recognition techniques and its applications. ➤ To develop the mathematical tools required for the pattern recognition. ➤ To understand the concept of pattern and the basic approach in developing pattern recognition algorithms. ➤ To develop prototype pattern recognition algorithms that can be applied against real-world multivariate data. ➤ To effectively implement pattern recognition algorithms for specific applications using simulation tools.				
UNIT - I	PATTERN RECOGNITION OVERVIEW	15		
Pattern recognition, Classification and Description-Patterns and feature Extraction with Examples- Training and Learning in PR systems-Pattern recognition Approaches.				
UNIT - II	STATISTICAL PATTERN RECOGNITION	15		
Introduction to statistical Pattern Recognition-supervised Learning using Parametric and Non-Parametric Approaches.				
UNIT - III	LINEAR DISCRIMINANT FUNCTIONS	15		
Introduction-Discrete and binary Classification Problems Techniques to directly Obtain linear Classifiers - Formulation of Unsupervised Learning Problems-Clustering for unsupervised learning and classification				
UNIT - IV	SYNTACTIC PATTERN RECOGNITION	15		
Overview of Syntactic Pattern Recognition-Syntactic recognition via parsing and other grammars– Graphical Approaches to syntactic pattern recognition-Learning via grammatical inference.				
UNIT - V	NEURAL PATTERN RECOGNITION	15		
Introduction to Neural Networks-Feed forward Networks and training by Back Propagation-Content Addressable Memory Approaches and Unsupervised Learning in Neural PR				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Robert J. Schalkoff, Pattern Recognition: Statistical ,Structural and Neural Approaches, John wiley&sons,2007

BOOKS FOR REFERENCES:

- “Earl Gose, Richard Johnson baugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India, Pvt Ltd, New Delhi.
- Duda R.O., P.E.Hart& D.G Stork, Pattern Classification, 2nd Edition, J.Wiley.
- Duda R.O.& Hart P.E., Pattern Classification and Scene Analysis, J.wiley.
- Bishop C.M., Neural Networks for Pattern Recognition, Oxford University Press.

WEB RESOURCES:

- ❖ <https://www.geeksforgeeks.org/pattern-recognition-introduction/>
- ❖ https://www.w3schools.com/ai/ai_recognition.asp
- ❖ <https://www.v7labs.com/blog/pattern-recognition-guide>

Nature of Course	EMPLOYABILITY			✓	SKILL ORIENTED			ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	To learn the fundamentals of Pattern Recognition techniques.	K1 to K4
CO2	To learn the various Statistical Pattern recognition techniques.	K1 to K4
CO3	To learn the linear discriminant functions and unsupervised learning and clustering.	K1 to K4
CO4	To learn the various Syntactical Pattern recognition techniques.	K1 to K4
CO5	To learn the Neural Pattern recognition techniques.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	M	-	-	-	-
CO2	M	S	S	S	S	M	-	-	-	-
CO3	S	M	S	S	S	S	-	-	-	-
CO4	S	S	S	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-

S- STRONG**M – MEDIUM****L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	3	2	2
CO 2	2	3	3	3	3	2
CO 3	3	2	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	13	14	15	14	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	100%	93%	100%	100%	93%

LESSON PLAN:

UNIT	Pattern Recognition	HRS	PEDAGOGY
I	PATTERN RECOGNITION OVERVIEW: Pattern recognition, Classification and Description-Patterns and feature Extraction with Examples-Training and Learning in PR systems-Pattern recognition Approaches	15	ICT/Chalk & Talk
II	STATISTICAL PATTERN RECOGNITION: Introduction to statistical Pattern Recognition-supervised Learning using Parametric and Non-Parametric Approaches.	15	ICT/Chalk & Talk
III	LINEAR DISCRIMINANT FUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING: Introduction-Discrete and binary Classification Problems Techniques to directly Obtain linear Classifiers - Formulation of Unsupervised Learning Problems-Clustering for unsupervised learning and classification	15	ICT/Chalk & Talk
IV	SYNTACTIC PATTERN RECOGNITION: Overview of Syntactic Pattern Recognition-Syntactic recognition via parsing and other grammars-Graphical Approaches to syntactic pattern recognition-Learning via grammatical inference.	15	ICT/Chalk & Talk
V	NEURAL PATTERN RECOGNITION: Introduction to Neural Networks-Feedforward Networks and training by Back Propagation-Content Addressable Memory Approaches and Unsupervised Learning in Neural PR	15	ICT/Chalk & Talk

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Cyber Forensics			
Course Code	23UAIEC66	L	P	C
Category	Elective	5	-	3

COURSE OBJECTIVES:

- To study the fundamentals of Computer Forensics.
- To learn, analyze and validate Forensics Data.
- To correctly define and cite appropriate instances for the application of computer forensics.
- To correctly collect and analyze computer forensic evidence and data seizure.
- To identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics.

UNIT - I Overview of Computer Forensics Technology 15

Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer- Forensics in Law Enforcement, Computer Forensics Assistance to Human.- Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional.- Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer. - Forensics Technology: Types of Business Computer Forensic, Technology

UNIT - II Computer Forensics Evidence and capture 15

Data Recovery: Data Recovery Defined, Data Backup and Recovery, The Role of Back –Data Recovery, The Data –Recovery Solution. Evidence Collection and Data Seizure: Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collections, Artefacts, Collection Steps, Controlling Contamination: The chain of custody.

UNIT - III Duplication and Preservation of Digital Evidence 15

Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication, Practical Consideration, Practical Implementation.

UNIT - IV Computer Forensics Analysis 15

Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.

UNIT - V Reconstructing Past Events 15

How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, a technical approach, Destruction Of E-Mail, Damaging Computer Evidence, Documenting - The Intrusion on Destruction of Data, System Testing.

Total Lecture Hours	75
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BOOKS FOR STUDY:

- John R. Vacca, Computer Forensics: Computer Crime Investigation, 3edition, Firewall Media, New Delhi, 2002.

BOOKS FOR REFERENCES:

- Nelson, Phillips Enfinger, Steuart, Computer Forensics and Investigations|| Enfinger, Steuart, CENGAGE Learning, 2004.
- Anthony Sammes and Brian Jenkinson, Forensic Computing: A Practitioner's Guidel, Second Edition, Springer Verlag London Limited, 2007.
- Robert M. Slade, Software Forensics Collecting Evidence from the Scene of a DigitalCrimel, TMH 2005.

WEB RESOURCES:

- ❖ https://onlinecourses.swayam2.ac.in/cec21_ge10/preview
- ❖ <https://www.ibm.com/think/topics/computer-forensics>
- ❖ <https://www.geeksforgeeks.org/cyber-forensics/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL			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.									

COURSE OUTCOMES:**K LEVEL**

After studying this course, the students will be able to:

CO1	Understand the definition of computer forensics fundamentals.	K1 to K4
CO2	Evaluate the different types of computer forensics technology.	K1 to K4
CO3	Analyze various computer forensics systems.	K1 to K4
CO4	Apply the methods for data recovery, evidence collection and dataseizure.	K1 to K4
CO5	Gain your knowledge of duplication and preservation of digital evidence.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	-	-	-	-
CO2	M	S	S	S	S	M	-	-	-	-
CO3	S	M	M	S	S	S	-	-	-	-
CO4	S	M	M	S	S	S	-	-	-	-
CO5	S	S	S	S	S	S	-	-	-	-
S- STRONG			M - MEDIUM			L - LOW				

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	2	2	2
CO 2	2	3	3	3	3	2
CO 3	3	2	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	13	14	14	14	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	87	87	80	67	87	80

LESSON PLAN:

UNIT	Cyber Forensics	HRS	PEDAGOGY
I	Overview of Computer Forensics Technology: Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer Forensics Technology: Types of Business Computer Forensic Technology–Types of	15	ICT/Chalk&Talk
II	Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined, Data Back up and Recovery, The Role of Back –up in Data Recovery, The Data –Recovery Solution. Evidence Collection and Data Seizure: Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collections, Artefacts, Collection Steps, Controlling Contamination: The chain of custody.	15	ICT/Chalk&Talk
III	Duplication and Preservation of Digital Evidence: Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication, Practical Consideration, Practical Implementation.	15	ICT/Chalk&Talk
IV	Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.	15	ICT/Chalk&Talk

V	Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, a technical approach, Destruction Of E-Mail, Damaging Computer Evidence, Documenting The Intrusion on Destruction of Data, System Testing.	15	ICT/Chalk&Talk
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Learning Outcome Based Education & Assessment (LOBE)						
Formative Examination - Blue Print						
Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO2	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
CI AII	CO3	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,K4)
	CO4	K1 – K4	2	K1,K2	2(K3,K3)	2(K4,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 I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	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)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions 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
(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 Paper – Format

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

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 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 ARTIFICIAL INTELLIGENCE FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	Data Mining and Warehousing Lab			
Course Code	23UAISP61	L	P	C
Category	Skill	-	2	2

COURSE OBJECTIVES:

- To inculcate fundamental concepts that provides the foundation of data mining.
- To enlist various algorithms used in information analysis of Data Mining Techniques.
- To demonstrate the knowledge retrieved through solving problems.
- To use visualizations techniques for interpretations.
- To evaluate the different models of OLAP and data preprocessing.

S. No.	LAB EXERCISE	30Hrs
	1. Implement Apriori algorithm to extract association rule of data mining 2. Implement k-means clustering technique. 3. Implement any one Hierarchal Clustering. 4. Implement Classification algorithm. 5. Implement Decision Tree. 6. Linear Regression. 7. Data Visualization	
TOTAL HOURS		30

BOOKS FOR STUDY:

- MargaretH. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education,2008
- C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition,2008

BOOKS FOR REFERENCES:

- ArunK. Pujari, "Data Mining Techniques", UniversitiesPress(India)Pvt. Ltd.,2005
- Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2007

WEB RESOURCES:

- ❖ https://onlinecourses.nptel.ac.in/noc21_cs06/preview
- ❖ <http://geeksforgeeks.org/data-warehousing/>
- ❖ <https://www.snowflake.com/trending/data-warehousing-and-data-mining-for-bi/>

Nature of Course	EMPLOYABILITY			✓	SKILL ORIENTED			ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL			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.										

COURSE OUTCOMES:										K LEVEL		
After studying this course, the students will be able to:												
CO1	Be familiar with mathematical foundations of data mining tools									K1 to K4		
CO2	Ability to understand the role of data mining in knowledge discovery process									K1 to K4		
CO3	To exercise the data mining techniques such as classification, clustering, pattern mining etc with different datasets and dynamic parameter									K1 to K4		
CO4	To learn about finding data characteristics and evaluating the outcome of data mining process.									K1 to K4		
CO5	To familiarize with various machine learning algorithms used in data mining									K1 to K4		
MAPPING WITH PROGRAM OUTCOMES:												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	S	S	S	S	M	-	-	-	-		
CO2	S	S	S	M	S	S	-	-	-	-		
CO3	S	S	S	S	S	S	-	-	-	-		
CO4	M	S	S	S	S	S	-	-	-	-		
CO5	S	S	S	S	S	S	-	-	-	-		
S- STRONG			M – MEDIUM					L - LOW				
CO / PO MAPPING:												
COS		PSO1		PSO2		PSO3		PSO4		PSO5		PSO6
CO 1		3		3		3		3		3		2
CO 2		3		3		3		2		3		3
CO 3		3		3		3		3		3		3
CO 4		2		3		3		3		3		3
CO 5		3		3		3		3		3		3
WEIGHTAGE		14		15		15		14		15		14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS		93%		100%		100%		93%		100%		93%

LESSON PLAN:

S. No	Data mining and Warehousing Lab	HRS	PEDAGOGY
1	Implement Apriori algorithm to extract association rule of data mining.	30	Demonstration, Hands-on Training
2	Implement K-means clustering technique		
3	Implement any one Hierarchical Clustering.		
4	Implement Classification algorithm		
5	Implement Decision Tree.		
6	Linear Regression.		
7	Data Visualization.		
8	Pattern Recognition Application using Bayesian Inference		

Learning Outcome Based Education & Assessment (LOBE)							
Formative Examination - Blue Print							
Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	COs	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CIA	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA		No. of Questions to be asked	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		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	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
	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	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output	
1	CO1	K1	15					
2	CO2	K2		15				
3	CO3	K3			15			
4	CO4	K3				15		
5	CO5	K4					15	
Question Pattern		No. of Questions to be asked	2	2	2	2	2	
		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	

Distribution of Marks with K Level								
K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15			15	20	20
K4				15		15	20	20
K5					15	15	20	20
Marks						75	100	100