

# M.Sc., COMPUTER SCIENCE

## Syllabus

Program Code: PCS

2023-2024 onwards



**MANNAR THIRUMALAI NAICKER COLLEGE**

(AUTONOMOUS)

**Re-accredited with “A” Grade by NAAC**

**PASUMALAI, MADURAI – 625 004**

# **GUIDLINES FOR OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM**

**(FOR PG PROGRAM FROM 2023 -2024 ONWARDS)**

## **ELIGIBILITY CONDITION FOR ADMISSION**

For admission to Post Graduate Programmers (P.G) a candidate should have passed the 3years degree course (under 10 + 2 + 3 pattern) recognized by the university as equivalent there to.

## **DURATION**

Two years. Each year consists of 2 semesters. The duration of a semester is 90 working days.

## **ATTENDANCE**

75% of the classes in each semester shortage of attendance can be condoned as per existing university rules.

## **EVALUATION PROCEDURE:**

$$\text{A mark Statement with CGPA} = \frac{\sum(\text{Marks} \times \text{credits})}{\sum(\text{Credits})}$$

Where the summations are over all paper appeared up to the current semester.

Examinations: 3 hours duration.

Total marks 100 for all papers

External Internal ratio 75:25 with 2 Internal tests.

## **Subjects of Study**

The courses offered under the PG programs belong to the following categories:

1. Core Subjects
2. Electives
3. Non Major Electives (NME)
4. Skill Enhancement course

## **CBCS COURSE STRUCTURE - PG COURSES**

**M.A. (Tamil) - M.A. (English) – M.Com. – M.Com (CA) – M.S.W.**

**M.Sc. (Mathematics) - M.Sc. (CS) - M.Sc. (CS&IT)**

Semester-I	Credit	Semester-II	Credit	Semester-III	Credit	Semester-IV	Credit
1.1. Core-I	4	2.1. Core-IV	4	3.1. Core-VII	4	4.1. Core-X	4
1.2 Core-II	4	2.2 Core-V	4	3.2 Core-VII	4	4.2 Core-XI	4
1.3 Core – III	4	2.3 Core – VI	4	3.3 Core – IX	4	4.3 Core – XII	4
1.4 Elective (Generic / Discipline Centric)- I	3	2.4 Elective (Generic / Discipline Centric) – III	3	3.4 Elective (Generic / Discipline Centric) – V	3	4.4 Elective (Generic / Discipline Centric) – VI	3
1.5 Elective (Generic / Discipline Centric)-II	3	2.5 Elective (Generic / Discipline Centric)-IV	3	3.5 Core Industry Module	3	4.5 Project with Viva-Voce	3
1.6 Ability Enhancement Course- Soft Skill -1	2	2.6 Ability Enhancement Course - Soft Skill -2	2	3.6 Ability Enhancement Course- Soft Skill -3	2	4.6 Ability Enhancement Course- Soft Skill -4	2
Skill Enhancement Course SEC 1	2	2.7 Skill Enhancement Course SEC 2	2	3.7 Skill Enhancement Course – Term Paper and Seminar Presentation SEC 3	2	4.7 Skill Enhancement Course - Professional Competency Skill	2
				3.8 Internship/ Industrial Activity	2	4.8 Extension Activity	1
	<b>22</b>		<b>22</b>		<b>24</b>		<b>23</b>
	<b>Total Credit Points</b>						<b>91</b>

**QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL  
ASSESSMENT**

**Note: Duration – 1 hour 30 minutes**

The components for continuous internal assessment are:

**Part –A**

Four multiple choice questions (answer all) 4 x 01= 04 Marks

**Part –B**

Two questions ('either .... or 'type) 2 x 05=10 Marks

**Part –C**

Two questions ('either .... or 'type) 2 x 08=16 Marks

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Total 40 Marks  
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**The components for continuous internal assessment are:**

(40 Marks of two continuous internal assessments will be converted to 15 marks)

Two tests and their average --15 marks

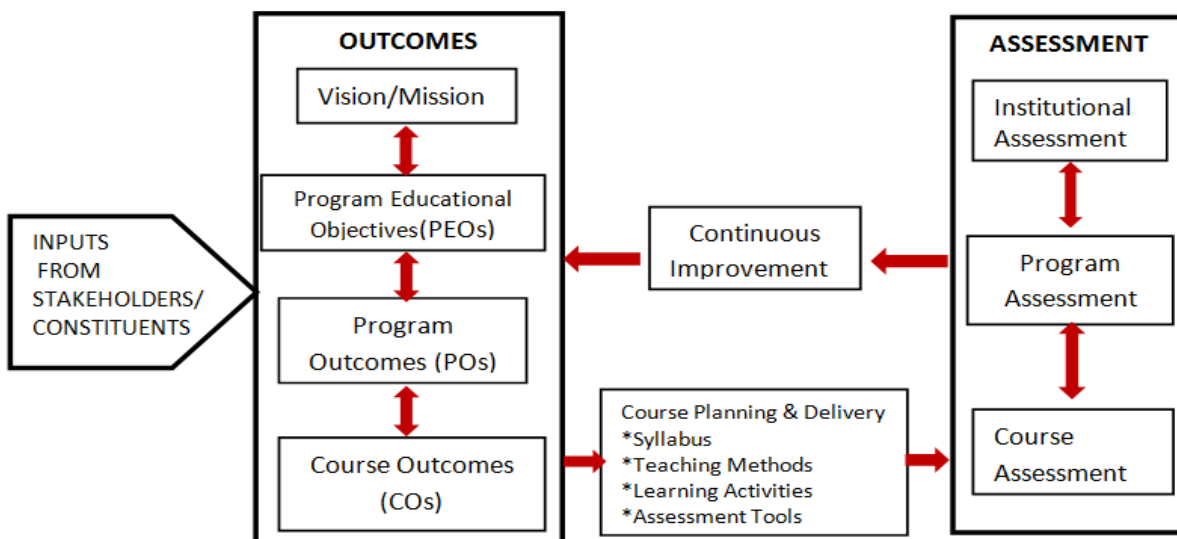
Seminar /Group discussion --5 marks

Assignment --5 marks

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Total 25 Marks  
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## **OUTCOME BASED EDUCATION**

1. Course is defined as a theory, practical or theory cum practical subject studied in a semester. For e.g. Computer Applications Management
2. Course Outcome (CO) Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Outcomes may be specified for each course based on its weightage.
3. Program is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree.
4. Program Outcomes (POs) Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be Guidelines for Outcome Based Education System 4 aligned closely with Graduate Attributes.
5. Program Educational Objectives (PEOs) of a program are the statements that describe the expected achievements of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after graduation.
6. Program Specific Outcomes (PSO) are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a Program.
7. Graduate Attributes (GA): The graduation attributes, are exemplars of the attributes expected of a graduate from a Program



## **INSTITUTIONAL VISION**

To Mould the learners into accomplished individuals by providing them with a stimulus for social change through character, confidence and competence.

## **INSTITUTIONAL MISSION**

1. Enlightening the learners on the ethical and environmental issues.
2. Extending holistic training to shape the learners in to committed and competent citizens.
3. Equipping them with soft skills for facing the competitive world.
4. Enriching their employability through career oriented courses.
5. Ensuring accessibility and opportunity to make education affordable to the underprivileged.

### **Highlights of the Revamped Curriculum:**

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.

- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

**MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),**  
**MADURAI – 625 004**  
**M. SC COMPUTER SCIENCE CURRICULUM**  
*(For the student admitted during the academic year 2023-2024 onwards)*

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
<b>FIRST SEMESTER</b>						
<b>Part – III</b>	<b>Core Courses</b>					
23PCSCC11	ANALYSIS AND DESIGN OF ALGORITHMS	6	5	25	75	100
23PCSCC12	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	6	5	25	75	100
23PCSCC13	PYTHON PROGRAMMING	6	5	25	75	100
23PCSCP11	ALGORITHM AND OOPS LAB	4	3	25	75	100
23PCSCP12	PYTHON PROGRAMMING LAB	4	3	25	75	100
<b>Part – III</b>	<b>Elective Course</b>					
23PCSEC11	ADVANCED SOFTWARE ENGINEERING	4	3	25	75	100
<b>Total</b>		<b>30</b>	<b>24</b>	<b>150</b>	<b>450</b>	<b>600</b>
<b>SECOND SEMESTER</b>						
<b>Part – III</b>	<b>Core Courses</b>					
23PCSCC21	DATA MINING AND WAREHOUSING	6	5	25	75	100
23PCSCC22	ADVANCED OPERATING SYSTEMS	6	5	25	75	100
23PCSCC23	ADVANCED JAVA PROGRAMMING	6	5	25	75	100
23PCSCP21	ADVANCED JAVA PROGRAMMING LAB	4	3	25	75	100
<b>Part – III</b>	<b>Elective Course</b>					
23PCSEC21	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	4	3	25	75	100
<b>Part – IV</b>	<b>Skill Enhancement course</b>					
23PCSSP21	DATA MINING LAB USING R	2	2	25	75	100
<b>Total</b>		<b>28</b>	<b>23</b>	<b>150</b>	<b>450</b>	<b>600</b>



# FIRST SEMESTER



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ANALYSIS AND DESIGN OF ALGORITHMS			
<b>Course Code</b>	23PCSCC11	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Enable the students to learn the Elementary Data Structures and algorithms.</li><li>➤ Presents an introduction to the algorithms, their analysis and design</li><li>➤ Discuss about Basic Traversal And Search Techniques</li><li>➤ Understand the Divide and Conquer method, Dynamic Programming and Backtracking for problem solving</li><li>➤ Understood the various design and analysis of the algorithms.</li></ul>				
<b>UNIT - I INTRODUCTION</b>				<b>18 hours</b>
Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph.				
<b>UNIT - II TRAVERSAL AND SEARCH TECHNIQUES</b>				<b>18 hours</b>
Basic Traversal And Search Techniques: Techniques for Binary Trees-Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.				
<b>UNIT - III GREEDY METHOD</b>				<b>18 hours</b>
The Greedy Method: - General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.				
<b>UNIT - IV DYNAMIC PROGRAMMING</b>				<b>16 hours</b>
Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.				
<b>UNIT - V BACK TRACKING</b>				<b>18 hours</b>
Backtracking:- General Method–8-Queens Problem–Sum Of Subsets–Graph Coloring – Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson.				
<b>UNIT -VI Contemporary Issues</b>				<b>2 hours</b>
Expert lectures, online seminars– webinars				
<b>Total Lecture Hours</b>				<b>90 hours</b>

**BOOKS FOR STUDY:**

- Ellis Horowitz, "Computer Algorithms", Galgotia Publications.
- Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

**BOOKS FOR REFERENCES:**

- Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
- Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008
- Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
- Robert Sedgewick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison- Wesley Publishing Company, 1996.

**WEB RESOURCES:**

- ❖ <https://nptel.ac.in/courses/106/106/106106131/>
- ❖ [https://www.tutorialspoint.com/design\\_and\\_analysis\\_of\\_algorithms/index.htm](https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm)
- ❖ <https://www.javatpoint.com/daa-tutorial>

<b>Nature of Course</b>	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP	
<b>Curriculum Relevance</b>	LOCAL	REGIONAL	NATIONAL		✓	GLOBAL	
<b>Changes Made in the Course</b>	Percentage of Change		80%	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:

<b>CO1</b>	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquertechnique.	<b>K1,K2</b>
<b>CO2</b>	Gain good understanding of Greedy method and its algorithm.	<b>K2,K3</b>
<b>CO3</b>	Able to describe about graphs using dynamic programming technique.	<b>K3,K4</b>
<b>CO4</b>	Demonstrate the concept of backtracking & branch and bound technique.	<b>K5, K6</b>
<b>CO5</b>	Explore the traversal and searching technique and apply it for trees and graphs	<b>K6</b>

**MAPPING WITH PROGRAM OUTCOMES:**

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

**S- STRONG****M - MEDIUM****L - LOW**

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO 3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>14</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>93%</b>	<b>100%</b>	<b>93%</b>	<b>93%</b>	<b>100%</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>ANALYSIS AND DESIGN OF ALGORITHMS</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>II</b>	Basic Traversal And Search Techniques: Techniques for Binary Trees- Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>III</b>	The Greedy Method:- General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>IV</b>	Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling	<b>16</b>	<b>LCD, CHALK &amp; TALK</b>
<b>V</b>	Backtracking:- General Method–8-Queens Problem–Sum Of Subsets– Graph Coloring– Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, online seminars–webinars</b>

**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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

<b>Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)</b>						
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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
<b>No. of Questions to be Asked</b>			10		10	10
<b>No. of Questions to be answered</b>			10		5	5
<b>Marks for each question</b>			1		5	8
<b>Total Marks for each section</b>			10		25	40
<b>(Figures in parenthesis denotes, questions should be asked with the given K level)</b>						

<b>Distribution of Marks with K Level</b>						
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
<b>Marks</b>	<b>10</b>	<b>50</b>	<b>80</b>	<b>140</b>	<b>100</b>	<b>100</b>
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>						

## Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		





# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	OBJECT ORIENTED ANALYSIS AND DESIGN & C++			
<b>Course Code</b>	23PCSCC12	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b> The main objectives of this course are to: <ul style="list-style-type: none"><li>➤ Present the object model, classes and objects, object orientation, machine view and model management view.</li><li>➤ Enables the students to learn the basic functions, principles and concepts of object oriented analysis and design.</li><li>➤ Enable the students to understand Basic statements of C++ language</li><li>➤ Motivate the students to learn the Constructors Inheritance and other concepts.</li><li>➤ Know the file concepts related to OOAD</li></ul>				
<b>UNIT - I</b>	<b>OBJECT MODEL</b>	<b>18 hours</b>		
The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.				
<b>UNIT - II</b>	<b>CLASSES AND OBJECTS</b>	<b>18 hours</b>		
Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.				
<b>UNIT - III</b>	<b>C++ INTRODUCTION</b>	<b>18 hours</b>		
Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.				
<b>UNIT - IV</b>	<b>INHERITANCE AND OVERLOADING</b>	<b>16hours</b>		
Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion-Inheritance – Pointers and Arrays.				
<b>UNIT - V</b>	<b>POLYMORPHISM AND FILES</b>	<b>18 hours</b>		
Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling –String Handling -Templates.				
<b>UNIT - VI</b>	<b>Contemporary Issues</b>	<b>2 hours</b>		
Expert lectures, online seminars –webinars				
<b>Total Lecture Hours</b>				<b>90 hours</b>

**BOOKS FOR STUDY:**

- “Object Oriented Analysis and Design with Applications”, Grady Booch, Second Edition, Pearson Education.
- “Object-Oriented Programming with ANSI & Turbo C++” ,Ashok N. Kamthane, First Indian Print - 2003, Pearson Education.

**BOOKS FOR REFERENCES:**

- Balagurusamy “Object Oriented Programming with C++”, TMH, Second Edition, 2003.

**WEB RESOURCES:**

- ❖ [https://onlinecourses.nptel.ac.in/noc19\\_cs48/preview](https://onlinecourses.nptel.ac.in/noc19_cs48/preview)
- ❖ <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/>
- ❖ [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ood\\_obje ct\\_oriented\\_analysis.html](https://www.tutorialspoint.com/object_oriented_analysis_design/ood_obje ct_oriented_analysis.html)

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

<b>COURSE OUTCOMES:</b>										<b>K LEVEL</b>
<b>After studying this course, the students will be able to:</b>										
<b>CO1</b>	Understand the concept of Object-Oriented development and modeling techniques									<b>K1,K2</b>
<b>CO2</b>	Gain knowledge about the various steps performed during object design									<b>K2,K3</b>
<b>CO3</b>	Abstract object-based views for generic software systems									<b>K3</b>
<b>CO4</b>	Link OOAD with C++ language									<b>K4,K5</b>
<b>CO5</b>	Apply the basic concept of OOPs and familiarize to write C++ program									<b>K5,K6</b>
<b>MAPPING WITH PROGRAM OUTCOMES:</b>										
<b>CO/PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>S- STRONG</b>			<b>M – MEDIUM</b>				<b>L - LOW</b>			

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>14</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100%</b>	<b>93%</b>	<b>86%</b>	<b>93%</b>	<b>93%</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN &amp; C++</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.	<b>18</b>	<b>LCD, BLACK BOARD</b>
<b>II</b>	Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.	<b>18</b>	<b>LCD, BLACK BOARD</b>
<b>III</b>	Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.	<b>18</b>	<b>LCD, BLACK BOARD</b>
<b>IV</b>	Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion- Inheritance – Pointers and Arrays.	<b>16</b>	<b>LCD, BLACK BOARD</b>
<b>V</b>	Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling –String Handling -Templates	<b>18</b>	<b>LCD, BLACK BOARD</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, online seminars , webinars</b>

**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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

<b>Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)</b>						
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	<b>K1-K4</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	<b>K1-K4</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	<b>K1-K4</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	<b>K1-K5</b>	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	<b>K1-K6</b>	2	K1,K2	2 (K3,K3)	2 (K6,K6)
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
<b>(Figures in parenthesis denotes, questions should be asked with the given K level)</b>						

<b>Distribution of Marks with K Level</b>						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
<b>K1</b>	<b>5</b>			<b>5</b>	<b>3.57</b>	<b>3.57</b>
<b>K2</b>	<b>5</b>			<b>5</b>	<b>3.57</b>	<b>3.57</b>
<b>K3</b>		<b>50</b>		<b>50</b>	<b>35.72</b>	<b>35.72</b>
<b>K4</b>			<b>48</b>	<b>48</b>	<b>34.28</b>	<b>34.28</b>
<b>K5</b>			<b>16</b>	<b>16</b>	<b>11.43</b>	<b>11.43</b>
<b>K6</b>			<b>16</b>	<b>16</b>	<b>11.43</b>	<b>11.43</b>
<b>Marks</b>	<b>10</b>	<b>50</b>	<b>80</b>	<b>140</b>	<b>100</b>	<b>100</b>

**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			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	PYTHON PROGRAMMING			
<b>Course Code</b>	23PCSCC13	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Presents an introduction to Python, creation of web applications, network applications and working in the clouds</li><li>➤ Use functions for structuring Python programs</li><li>➤ Understand different Data Structures of Python</li><li>➤ Represent compound data using Python lists, tuples and dictionaries</li></ul>				
<b>UNIT - I INTRODUCTION</b>				<b>18hours</b>
<b>Python:</b> Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.				
<b>UNIT - II CODE STRUCTURES</b>				<b>18hours</b>
<b>Code Structures:</b> if, elif, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.				
<b>UNIT - III MODULES, PACKAGES AND CLASSES</b>				<b>18hours</b>
<b>Modules, Packages, and Programs:</b> Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. <b>Objects and Classes:</b> Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–In self Defense–Get and Set Attribute Values with Properties –Name Mangling for Privacy–Method Types – Duck Typing – Special Methods –Composition.				
<b>UNIT - IV DATA TYPES AND WEB</b>				<b>16hours</b>
<b>Data Types:</b> Text Strings–Binary Data. <b>Storing and Retrieving Data:</b> File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores. <b>Web:</b> Web Clients –Web Servers–Web Services and Automation				
<b>UNIT - V SYSTEMS AND NETWORKS</b>				<b>18hours</b>
<b>Systems:</b> Files–Directories–Programs and Processes–Calendars and Clocks. <b>Concurrency:</b> Queues– Processes–Threads–Green Threads and gevent–twisted–Redis. <b>Networks:</b> Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.				
<b>UNIT - VI Contemporary Issues</b>				<b>2 hours</b>
Expert lectures, online seminars –webinars				
<b>Total Lecture Hours</b>				<b>90hours</b>



**BOOKS FOR STUDY:**

- Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014.
- Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

**BOOKS FOR REFERENCES:**

- David M. Beazley, “Python Essential Reference”, Developer’s Library, Fourth Edition, 2009.
- Sheetal Taneja, Naveen Kumar, “Python Programming-A Modular Approach” ,Pearson Publications.

**WEB RESOURCES:**

- ❖ <https://www.programiz.com/python-programming/>
- ❖ <https://www.tutorialspoint.com/python/index.html>
- ❖ [https://onlinecourses.swayam2.ac.in/aic20\\_sp33/preview](https://onlinecourses.swayam2.ac.in/aic20_sp33/preview)

<b>Nature of Course</b>	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
<b>Curriculum Relevance</b>	LOCAL	REGIONAL		NATIONAL		GLOBAL		✓
<b>Changes Made in the Course</b>	Percentage of Change		100 %	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:

<b>CO1</b>	Understand the basic concepts of Python Programming	<b>K1,K2</b>
<b>CO2</b>	Understand File operations, Classes and Objects	<b>K2,K3</b>
<b>CO3</b>	Acquire Object Oriented Skills in Python	<b>K3,K4</b>
<b>CO4</b>	Develop web applications using Python	<b>K5</b>
<b>CO5</b>	Develop Client Server Networking applications	<b>K5,K6</b>

**MAPPING WITH PROGRAM OUTCOMES:**

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

**S- STRONG****M – MEDIUM****L - LOW****CO / PO MAPPING:**

COS	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>

<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>15</b>	<b>14</b>	<b>15</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100</b>	<b>93.3</b>	<b>93.3</b>	<b>100</b>	<b>100</b>

### LESSON PLAN:

<b>UNIT</b>	<b>PYTHON PROGRAMMING</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	<b>Python:</b> Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>II</b>	<b>Code Structures:</b> if, elseif, and else – Repeat with while – Iterate with for – Comprehensions –Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>III</b>	<b>Modules, Packages, and Programs:</b> Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. <b>Objects and Classes:</b> Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–In self Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy –Method Types – Duck Typing – Special Methods –Composition	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>IV</b>	<b>Data Types:</b> Text Strings–Binary Data. <b>Storing and Retrieving Data:</b> File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores. <b>Web:</b> Web Clients –Web Servers–Web Services and Automation	<b>16</b>	<b>LCD, CHALK &amp; TALK</b>
<b>V</b>	<b>Systems:</b> Files–Directories–Programs and Processes– Calendars and Clocks. <b>Concurrency:</b> Queues Processes – Threads – Green Threads and event–twisted–Redis. <b>Networks:</b> Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Workingin the Clouds.	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, online seminars – webinars</b>

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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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AI	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

<b>Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)</b>						
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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
<b>No. of Questions to be Asked</b>			10		10	10
<b>No. of Questions to be answered</b>			10		5	5
<b>Marks for each question</b>			1		5	8
<b>Total Marks for each section</b>			10		25	40
<b>(Figures in parenthesis denotes, questions should be asked with the given K level)</b>						

<b>Distribution of Marks with K Level</b>						
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
<b>Marks</b>	<b>10</b>	<b>50</b>	<b>80</b>	<b>140</b>	<b>100</b>	<b>100</b>
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>						

## Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ALGORITHM AND OOPS LAB			
<b>Course Code</b>	23PCSCP11	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	-	4	3

#### COURSE OBJECTIVES:

The main objectives of this course are to:

- This course covers the basic data structures like Stack, Queue, Tree, List.
- This course enables the students to learn the applications of the data structures using various techniques.
- It also enable the students to understand C++ language with respect to OOAD concepts
- Application of OOPS concepts.

#### LIST OF PROGRAMS

**60 Hours**

- 1) Write a program to solve the tower of Hanoi using recursion.
- 2) Write a program to traverse through binary search tree using traversals.
- 3) Write a program to perform various operations on stack using linked list.
- 4) Write a program to perform various operation in circular queue.
- 5) Write a program to sort an array of an elements using quick sort.
- 6) Write a program to solve number of elements in ascending order using heap sort.
- 7) Write a program to solve the knapsack problem using greedy method
- 8) Write a program to search for an element in a tree using divide& conquer strategy.
- 9) Write a program to place the 8 queen son an 8X8matrixso that no two queens Attack.
- 10) Write a C++ program to perform Virtual Function
- 11) Write a C++ program to perform Parameterized constructor
- 12) Write a C++ program to perform Friend Function
- 13) Write a C++ program to perform Function Overloading
- 14) Write a C++ program to perform Single Inheritance
- 15) Write a C++program to perform Employee Details using files.

Expert lectures, online seminars –webinars

**Total Lecture Hours 60**

**BOOKS FOR STUDY:**

- Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
- Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008

**BOOKS FOR REFERENCES:**

- Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
- Robert Sedgewick, Phillippe Flajolet, "An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company, 1996.

**WEB RESOURCES:**

- ❖ [https://onlinecourses.nptel.ac.in/noc19\\_cs48/preview](https://onlinecourses.nptel.ac.in/noc19_cs48/preview)
- ❖ <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/>
- ❖ [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ooad\\_object\\_oriented\\_analysis.html](https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.html)

<b>Nature of Course</b>	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP			
<b>Curriculum Relevance</b>	LOCAL		REGIONAL			NATIONAL	✓	GLOBAL	
<b>Changes Made in the Course</b>	Percentage of Change		100 %	No Changes Made		-	New Course		✓

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

<b>COURSE OUTCOMES:</b>										<b>K LEVEL</b>
<b>After studying this course, the students will be able to:</b>										
<b>CO1</b>	Understand the concepts of object oriented with respect to C++									<b>K1,K2</b>
<b>CO2</b>	Able to understand and implement OOPS concepts									<b>K2,K3</b>
<b>CO3</b>	Implementation of data structures like Stack, Queue, Tree, List using C++									<b>K3,K4</b>
<b>CO4</b>	Application of the data structures for Sorting, Searching using different techniques.									<b>K4,K5</b>
<b>CO5</b>	Code, debug and test the programs with appropriate test cases									<b>K5,K6</b>
<b>MAPPING WITH PROGRAM OUTCOMES:</b>										
<b>CO/PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>S- STRONG</b>			<b>M - MEDIUM</b>				<b>L - LOW</b>			



**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>13</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100%</b>	<b>93%</b>	<b>93%</b>	<b>93%</b>	<b>100%</b>

**LESSON PLAN:**

<b>S. No</b>	<b>ALGORITHM AND OOPS LAB</b>	<b>HRS</b>	<b>PEDAGOGY</b>
1.	Write a program to solve the tower of Hanoi using recursion.	<b>60</b>	<b>LCD, HANDS ON TRAINING</b>
2.	Write a program to traverse through binary search tree using traversals.		
3.	Write a program to perform various operations on stack using linked list.		
4.	Write a program to perform various operation in circular queue.		
5.	Write a program to sort an array of an elements using quick sort.		
6.	Write a program to solve number of elements in ascending order using heap sort.		
7.	Write a program to solve the knapsack problem using greedy method		
8.	Write a program to search for an element in a tree using divide& conquer strategy.		
9.	Write a program to place the 8 queen son an 8X8matrixso that no two queens Attack.		
10.	Write a C++ program to perform Virtual Function		
11.	Write a C++ program to perform Parameterized constructor		
12.	Write a C++ program to perform Friend Function		
13.	Write a C++ program to perform Function Overloading		
14.	Write a C++ program to perform Single Inheritance		
15.	Write a C++program to perform Employee Details using files		

**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	2				
	CO2	K3		5			
	CO3	K4			5		
	CO4	K5, K6				10	
	CO5	K2					3
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		1	2.5	2.5	5	1.5
	Total Marks for each section		2	3	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	2					2	8	8
	K2		3				3	12	12
	K3			5			5	20	20
	K4				5		5	20	20
	K5					5	5	20	20
	K6					5	5	20	20
	Marks	2	3	5	5	10	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

**K5-** Evaluating, Justifying the problems with solutions

## K6-Creating solutions for applications

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	Cos	K Level	Syntax & Semantics	Program ming principles	Concept Applications	Coding& Implementation	Debugging & Output
1	CO1	K1	6				
2	CO2	K3		15			
3	CO3	K4			15		
4	CO4	K5, K6				30	
5	CO5	K2					9
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			3	7.5	7.5	15	4.5
Total Marks for each section			6	15	15	30	9

Distribution of Marks with K Level								
K Level	Syntax & Semantics	Program ming principles	Concept Applications	Codin g	Debuggi ng & Output	Total Marks	% of (Marks without choice)	Consol idated %
K1	6					6	8	8
K2		9				9	12	12
K3			15			15	20	20
K4				15		15	20	20
K5					15	6	20	20
K6					15	9	20	20
Marks	6	9	15	15	30	75	100	100
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>								



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	PYTHON PROGRAMMING LAB			
<b>Course Code</b>	23PCSCP12	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	-	4	3

#### COURSE OBJECTIVES:

The main objectives of this course are to:

- This course presents an overview of elementary data items, lists, dictionaries, sets and tuples
- To understand and write simple Python programs
- To Understand the OOPS concepts of Python
- To develop web applications using Python

#### List of Programs

**60 Hours**

Implement the following in Python:

1. Programs using elementary data items, lists, dictionaries and tuples
2. Programs using conditional branches,
3. Programs using loops.
4. Programs using functions
5. Programs using exception handling
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.

**Total Lecture Hours**

**60 Hours**

#### BOOKS FOR STUDY:

- Bill Lubanovic, "Introducing Python", O'Reilly, First Edition-Second Release, 2014.
- Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

#### BOOKS FOR REFERENCES:

- David M. Beazley, "Python Essential Edition, 2009.
- Sheetal Taneja, Naveen Kumar, Approach", Pearson Publications.

#### WEB RESOURCES:

- ❖ <https://www.programiz.com/python-programming/>
- ❖ <https://www.tutorialspoint.com/python/index.html>
- ❖ [https://onlinecourses.swayam2.ac.in/aic20\\_sp33/preview](https://onlinecourses.swayam2.ac.in/aic20_sp33/preview)

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

<b>COURSE OUTCOMES:</b>	<b>K LEVEL</b>
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On the successful completion of the course, student will be able to:

<b>CO1</b>	Able to write programs in Python using OOPS concepts	<b>K1</b>
<b>CO2</b>	To understand the concepts of File operations and Modules in Python	<b>K2</b>
<b>CO3</b>	Implementation of lists, dictionaries, sets and tuples as programs	<b>K3</b>
<b>CO4</b>	To develop web applications using Python	<b>K4</b>
<b>CO5</b>	Code, debug and test the programs with appropriate test cases	<b>K5</b>

**K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create**

<b>Mapping with Programming Outcomes</b>
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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	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

**S- STRONG**

**M – MEDIUM**

**L - LOW**

<b>CO / PO MAPPING:</b>
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
<b>WEITAGE</b>	<b>15</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100%</b>	<b>100%</b>	<b>93%</b>	<b>100%</b>	<b>93%</b>

**LESSON PLAN:**

S. No.	PYTHON PROGRAMMING LAB	HRS	PEDAGOGY
1.	Implement the following in Python: Programs using elementary data items, lists, dictionaries and tuples	<b>60</b>	<b>LCD &amp; HANDS ON TRAINING</b>
2.	Programs using conditional branches,		
3.	Programs using loops.		
4.	Programs using functions		
5.	Programs using exception handling		
6.	Programs using inheritance		
7.	Programs using polymorphism		
8.	Programs to implement file operations.		
9.	Programs using modules.		
10.	Programs for creating dynamic and interactive web pages using forms.		

**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
<b>CI A</b>	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K4				5	
	CO5	K5					5
<b>Question Pattern CIA</b>	<b>No. of Questions to be asked</b>		2	2	2	2	2
	<b>No. of Questions to be answered</b>		2	2	2	2	2
	<b>Marks for each question</b>		2.5	2.5	2.5	2.5	2.5
	<b>Total Marks for each section</b>		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					2	8	8
	K2		5				3	12	12
	K3			5			5	20	20
	K4				5		5	20	20
	K5					5	5	20	20
	K6						5	20	20
	Marks		5	5	5	5	5	25	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

**K5-**Evaluating, Justifying the problems with solutions

**K6-**Creating solutions for applications

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	K4				15	
5	CO5	K5					15
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

<b>Distribution of Marks with K Level</b>								
<b>K Level</b>	<b>Syntax &amp; Semantics</b>	<b>Programming principles</b>	<b>Concept Applications</b>	<b>Coding</b>	<b>Debugging &amp; Output</b>	<b>Total Marks</b>	<b>% of (Marks without choice)</b>	<b>Consolidated %</b>
<b>K1</b>	15					15	20	20
<b>K2</b>		15				15	20	20
<b>K3</b>			15			15	20	20
<b>K4</b>				15		15	20	20
<b>K5</b>					15	15	20	20
<b>Marks</b>	6	9	15	15	30	75	100	100
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>								





# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ADVANCED SOFTWARE ENGINEERING			
<b>Course Code</b>	23PCSEC11	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	ELECTIVE	4	-	3
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Introduce to Software Engineering, Design, Testing and Maintenance.</li><li>➤ Enable the students to learn the concepts of Software Engineering.</li><li>➤ Learn about Software Project Management, Software Design &amp; Testing.</li></ul>				
<b>UNIT - I INTRODUCTION</b>		<b>12hours</b>		
Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.				
<b>UNIT - II SOFTWARE REQUIREMENTS</b>		<b>12hours</b>		
Software Requirements Analysis and Specification: Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, SoftwareQuality Management System, ISO 9000, SEI CMM.				
<b>UNIT - III PROJECT MANAGEMENT</b>		<b>12hours</b>		
Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead’s software science – Staffing level estimation – Scheduling–Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan.				
<b>UNIT - IV SOFTWARE DESIGN</b>		<b>10hours</b>		
Software Design: Outcome of a Design process – Characteristics of a good software design –Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design - Detailed Design - IEEE Recommended Practice for Software Design Descriptions.				
<b>UNIT - V SOFTWARE TESTING</b>		<b>12hours</b>		
Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing - Regression testing – Art of Debugging–Testing tools-Metrics-Reliability Estimation. Software Maintenance -Maintenance Process - ReverseEngineering – Software Re-engineering - Configuration Management Activities.				
<b>UNIT - VI Contemporary Issues</b>		<b>2hours</b>		
Expert lectures, online seminars –webinars				
<b>Total Lecture Hours</b>				<b>60hours</b>

**BOOKS FOR STUDY:**

- An Integrated Approach to Software Engineering–Pankaj Jalote, Narosa Publishing House, Delhi,3rd Edition.
- Fundamentals of Software Engineering – Rajib Mall, PHI Publication, 3<sup>rd</sup> Edition.

**BOOKS FOR REFERENCES:**

- Software Engineering– K.K. Aggarwal and Yogesh Singh, New Age International Publishers, 3<sup>rd</sup> edition.
- A Practitioners Approach-Software Engineering,-R.S. Pressman, McGraw Hill.
- Fundamentals of Software Engineering – Carlo Ghezzi, M. Jarayeri, D. Manodrioli, PHI Publication.

**WEB RESOURCES:**

- ❖ <https://www.javatpoint.com/software-engineering-tutorial>
- ❖ [https://onlinecourses.swayam2.ac.in/cec20\\_cs07/preview](https://onlinecourses.swayam2.ac.in/cec20_cs07/preview)
- ❖ [https://onlinecourses.nptel.ac.in/noc19\\_cs69/preview](https://onlinecourses.nptel.ac.in/noc19_cs69/preview)

<b>Nature of Course</b>	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
<b>Curriculum Relevance</b>	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
<b>Changes Made in the Course</b>	Percentage of Change		100%	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 about Software Engineering process									K1,K2
CO2	Understand about Software project management skills, design and qualitymanagement									K2,K3
CO3	Analyze on Software Requirements and Specification									K3,K4
CO4	Analyze on Software Testing, Maintenance and Software Re-Engineering									K4,K5
CO5	Designandconductvarioustypesandlevelsofsoftwarequalityforasoftware project									K5,K6
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	M	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	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S
<b>S- STRONG</b>			<b>M – MEDIUM</b>				<b>L - LOW</b>			

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>WEITAGE</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>15</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>93%</b>	<b>93%</b>	<b>100%</b>	<b>100%</b>	<b>93%</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>ADVANCED SOFTWARE ENGINEERING</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes	<b>12</b>	<b>LCD, CHALK &amp; TALK</b>
<b>II</b>	Software Requirements Analysis and Specification: Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, Software Quality Management System, ISO 9000, SEI CMM.	<b>12</b>	<b>LCD, CHALK &amp; TALK</b>
<b>III</b>	Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead’s software science – Staffing level estimation – Scheduling– Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan	<b>12</b>	<b>LCD, CHALK &amp; TALK</b>
<b>IV</b>	Software Design: Outcome of a Design process – Characteristics of a good software design –Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design - Detailed Design - IEEE Recommended Practice for Software Design Descriptions.	<b>10</b>	<b>LCD, CHALK &amp; TALK</b>
<b>V</b>	Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of	<b>12</b>	<b>LCD, CHALK &amp;</b>

	testing – Validation testing - Regression testing – Art of Debugging– Testing tools-Metrics-Reliability Estimation. Software Maintenance - Maintenance Process - ReverseEngineering – Software Re-engineering - Configuration Management Activities.		<b>TALK</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, online seminars – webinars</b>

<b>Learning Outcome Based Education &amp; Assessment (LOBE)</b>						
<b>Formative Examination - Blue Print</b>						
<b>Articulation Mapping – K Levels with Course Outcomes (COs)</b>						
<b>Internal</b>	<b>Cos</b>	<b>K Level</b>	<b>Section A</b>		<b>Section B Either or Choice</b>	<b>Section C Either or Choice</b>
			<b>MCQs</b>			
			<b>No. of Questions</b>	<b>K - Level</b>		
<b>CI</b>	<b>CO1</b>	<b>K1 – K4</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
<b>AI</b>	<b>CO2</b>	<b>K1 – K4</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
<b>CI</b>	<b>CO3</b>	<b>K1 – K5</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
<b>AII</b>	<b>CO4</b>	<b>K1 – K6</b>	2	K1,K2	2 (K3,K3)	2 (K4,K4)
<b>Question Pattern CIA I &amp; II</b>		<b>No. of Questions to be asked</b>	4		4	4
		<b>No. of Questions to be answered</b>	4		2	2
		<b>Marks for each question</b>	1		5	8
		<b>Total Marks for each section</b>	4		10	16

**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, analysing, presentation and make inferences with evidences

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

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			16	16	28.57	57.1
	K5			16	16	28.57	
	Marks	4	20	32	56	100	100

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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
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			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# SECOND SEMESTER



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	DATA MINING AND WARE HOUSING			
<b>Course Code</b>	23PCSCC21	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.</li><li>➤ Develop skills of using recent data mining software for solving practical problems. Develop and apply critical thinking, problem-solving, and decision-making skills.</li><li>➤ Develop and apply critical thinking, problem-solving, and decision-making skills</li></ul>				
<b>UNIT - I BASICS AND TECHNIQUES</b>		<b>18hours</b>		
Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.				
<b>UNIT - II ALGORITHMS</b>		<b>18hours</b>		
Classification: Introduction –Statistical –based algorithms -distance–based algorithms-decision tree-based algorithms-neural network–based algorithms–rule-based algorithms–combining techniques.				
<b>UNIT - III CLUSTERING AND ASSOCIATION</b>		<b>18hours</b>		
Clustering: Introduction–Similarity and Distance Measures–Outliers–Hierarchical Algorithms Partitional Algorithms.-Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.				
<b>UNIT - IV DATA WAREHOUSING AND MODELING</b>		<b>16hours</b>		
Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.				
<b>UNIT - V APPLICATIONS OF DATA WAREHOUSE</b>		<b>10hours</b>		
Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.				
<b>UNIT - VI CONTEMPORARY ISSUES</b>		<b>2 hours</b>		
Expert lectures, online seminars –webinars				
<b>Total Lecture Hours</b>				<b>90 Hours</b>

**BOOKS FOR STUDY:**

- Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson education,2003
- C.S.R. Prabhu, “Data Warehousing Concepts, Techniques, Products and Applications”, PHI,Second Edition

**BOOKS FOR REFERENCES:**

- ArunK.Pujari, “Data Mining Techniques”,Universities Press(India)Pvt. Ltd.,2003.
- AlexBerson, StephenJ.Smith,“DataWarehousing, DataMining and OLAP”,TMCH, 2001
- Jiawei Han &Micheline Kamber, Academic press.“Data Mining Concepts&Techniques”,2001,

**WEB RESOURCES:**

- ❖ <https://www.javatpoint.com/data-warehouse>
- ❖ <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/>
- ❖ <https://www.btechguru.com/training-it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054-26--151.html>

<b>Nature of Course</b>	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP			
<b>Curriculum Relevance</b>	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓	
<b>Changes Made in the Course</b>	Percentage of Change		80 %	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:

<b>CO1</b>	Understand the basic data mining techniques and algorithms	<b>K1,K2</b>
<b>CO2</b>	Understand the Association rules, Clustering techniques and Data warehousing contents	<b>K2,K3</b>
<b>CO3</b>	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	<b>K4,K5</b>
<b>CO4</b>	Design data warehouse with dimensional modeling and apply OLAP operations	<b>K5,K6</b>
<b>CO5</b>	Identify appropriate data mining algorithms to solve real world problems	<b>K6</b>

**MAPPING WITH PROGRAM OUTCOMES:**

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

**S- STRONG****M – MEDIUM****L - LOW**

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>WEITAGE</b>	<b>14</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>93%</b>	<b>100%</b>	<b>100%</b>	<b>93%</b>	<b>93%</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>DATA MINING AND WARE HOUSING</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>II</b>	Classification: Introduction –Statistical –based algorithms -distance–based algorithms-decision tree- based algorithms-neural network–based algorithms–rule-based algorithms–combining techniques	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>III</b>	Clustering: Introduction–Similarity and Distance Measures–Outliers–Hierarchical Algorithms- Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>IV</b>	Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	<b>16</b>	<b>LCD CHALK &amp; TALK</b>
<b>V</b>	Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government:	<b>18</b>	<b>LCD CHALK &amp; TALK</b>

	Introduction - national data warehouses – other areas for data warehousing and data mining		
<b>VI</b>	<b>Contemporary Issues</b>	<b>2</b>	<b>Expert lectures, online seminars – webinars</b>

<b>Learning Outcome Based Education &amp; Assessment (LOBE)</b>						
<b>Formative Examination - Blue Print</b>						
<b>Articulation Mapping – K Levels with Course Outcomes (COs)</b>						
<b>Internal</b>	<b>Cos</b>	<b>K Level</b>	<b>Section A</b>		<b>Section B Either or Choice</b>	<b>Section C Either or Choice</b>
			<b>MCQs</b>			
			<b>No. of Questions</b>	<b>K - Level</b>		
<b>CI</b>	<b>CO1</b>	<b>K1 – K4</b>	2	K1,K2	2 (K3, K3)	2 (K4, K4)
<b>AI</b>	<b>CO2</b>	<b>K1 – K4</b>	2	K1,K2	2 (K3, K3)	2 (K4, K4)
<b>CI</b>	<b>CO3</b>	<b>K1 – K5</b>	2	K1,K2	2 (K3, K3)	2 (K4, K4)
<b>AII</b>	<b>CO4</b>	<b>K1 – K6</b>	2	K1,K2	2 (K3, K3)	2 (K5, K5)
<b>Question Pattern CIA I &amp; II</b>		<b>No. of Questions to be asked</b>	4		4	4
		<b>No. of Questions to be answered</b>	4		2	2
		<b>Marks for each question</b>	1		5	8
		<b>Total Marks for each section</b>	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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

**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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
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				<b>PART – A</b>	<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ADVANCED OPERATING SYSTEMS			
<b>Course Code</b>	23PCSCC22	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Enable the students to learn the different types of operating systems and their functioning.</li><li>➤ Gain knowledge on Distributed Operating Systems</li><li>➤ Gain in sight into the components and management aspects of realtime and mobile operating systems.</li><li>➤ Learn case studies in Linux Operating Systems.</li></ul>				
<b>UNIT - I BASICS OF OPERATING SYSTEMS</b>		<b>18hours</b>		
Basics of Operating Systems: What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery.				
<b>UNIT - II DISTRIBUTED OPERATING SYSTEMS</b>		<b>18 hours</b>		
Distributed Operating Systems: Issues – Communication Primitives – Lamport’s Logical Clocks –Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems–design issues – Case studies – The Sun Network File System-Coda.				
<b>UNIT - III REAL TIME OPERATING SYSTEM</b>		<b>18 hours</b>		
Realtime Operating Systems : Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling				
<b>UNIT - IV HAND HELD SYSTEM</b>		<b>16 hours</b>		
Operating Systems for Hand held Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian Operating System-Android–Architecture of android– Securing hand held systems.				
<b>UNIT - V CASE STUDIES</b>		<b>18 hours</b>		
Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.				
<b>UNIT – VI Contemporary Issues</b>		<b>2 hours</b>		
Expert lectures, online seminars–webinars				
<b>Total Lecture Hours</b>				<b>60 hours</b>

**BOOKS FOR STUDY:**

- Abraham Silberschatz; Peter Baer Galvin; GregGagne,“Operating System Concepts”, SeventhEdition, John Wiley & Sons, 2004.
- Mukesh Singhal and Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems –Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001.

**BOOKS FOR REFERENCES:**

- RajibMall,“Real-Time Systems:Theory and Practice”,Pearson Education India,2006.
- Pramod Chandra P.Bhatt, An introduction to operating systems, concept and practice, PHI,Third edition, 2010.
- Daniel.P.Bovet&MarcoCesati,“UnderstandingtheLinuxkernel”,3<sup>rd</sup>edition,O“Reilly,2005.
- Neil Smyth, “iPhone iOS 4 Development Essentials–X code”, Fourth Edition, Payload media, 2011.

**WEB RESOURCES:**

- ❖ [https://onlinecourses.nptel.ac.in/noc20\\_cs04/preview](https://onlinecourses.nptel.ac.in/noc20_cs04/preview)
- ❖ <https://www.udacity.com/course/advanced-operating-systems--ud189>
- ❖ <https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf>

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

<b>COURSE OUTCOMES:</b>	<b>K LEVEL</b>
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After studying this course, the students will be able to:

<b>CO1</b>	Understand the design issues associated with operating systems	<b>K1 to K2</b>
<b>CO2</b>	Master various process management concepts including scheduling, deadlocks and distributed file systems	<b>K3 to K4</b>
<b>CO3</b>	Prepare Real Time Task Scheduling	<b>K4 to K5</b>
<b>CO4</b>	Analyze Operating Systems for Handheld Systems	<b>K5</b>
<b>CO5</b>	Analyze Operating Systems like LINUX and IOS	<b>K5 to K6</b>

**K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create**

<b>MAPPING WITH PROGRAM OUTCOMES:</b>										
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CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>

**S- STRONG**

**M – MEDIUM**

**L - LOW**

<b>CO / PO MAPPING:</b>						
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>15</b>	<b>14</b>	<b>15</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100</b>	<b>100</b>	<b>93.3</b>	<b>100</b>	<b>93.3</b>

<b>LESSON PLAN:</b>			
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UNIT	ADVANCED OPERATING SYSTEMS	HRS	PEDAGOGY
<b>I</b>	Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -	<b>18</b>	<b>LCD CHALK &amp; TALK</b>

	Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery		
<b>II</b>	Distributed Operating Systems: Issues – Communication Primitives – Lamport’s Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies – The Sun Network File System-Coda.	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>III</b>	Operating Systems for Hand held Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian OperatingSystem-Android–Architecture of android–Securing hand held systems	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>IV</b>	Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	<b>16</b>	<b>LCD CHALK &amp; TALK</b>
<b>V</b>	Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System	<b>18</b>	<b>LCD CHALK &amp; TALK</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, online seminars–webinars</b>

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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

**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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
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			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ADVANCED JAVA PROGRAMMING			
<b>Course Code</b>	23PCSCC23	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	6	-	5
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ Enable the students to learn the basic functions, principles and concepts of advanced java programming.</li><li>➤ Provide knowledge on concepts needed for distributed Application Architecture.</li><li>➤ Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format</li></ul>				
<b>UNIT - I BASICS OF JAVA</b>		<b>15 hours</b>		
Java Basics Review: Components and event handling–Threading concepts–Networking features – Media techniques				
<b>UNIT - II REMOTE METHOD INVOCATION</b>		<b>15 hours</b>		
Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces				
<b>UNIT - III DATABASE</b>		<b>15 hours</b>		
JavainDatabases-JDBCprinciples–databaseaccess-Interacting-databasesearch–Creating multimedia databases – Database support in web applications				
<b>UNIT - IV SERVLETS</b>		<b>13 hours</b>		
Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Readingdata from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions-Scriptlets-Directives-Declarations-A complete example				
<b>UNIT - V ADVANCED TECHNIQUES</b>		<b>15 hours</b>		
JAR file format creation–Internationalization–Swing Programming–Advanced java Techniques				
<b>UNIT – VI CONTEMPORARY ISSUES</b>		<b>2 hours</b>		
Expert lectures, online seminars –webinars				
<b>Total Lecture Hours</b>				<b>60 hours</b>

**BOOKS FOR STUDY:**

- JamieJaworski,“Java Unleashed”,SAMSTechmedia Publications,1999.
- Campione, Walrath and Huml,“The Java Tutorial”,Addison Wesley,1999.

**BOOKS FOR REFERENCES:**

- Deitel and Deitel, “Java How to Program”,Third Edition, PHI/Pearson Education Asia.

**WEB RESOURCES:**

- ❖ <https://www.tutorialspoint.com/java/index.htm>
- ❖ <https://www.tutorialspoint.com/java/index.htm>
- ❖ [https://onlinecourses.nptel.ac.in/noc19\\_cs84/preview](https://onlinecourses.nptel.ac.in/noc19_cs84/preview)

<b>Nature of Course</b>	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
<b>Curriculum Relevance</b>	LOCAL	REGIONAL		NATIONAL		GLOBAL		✓
<b>Changes Made in the Course</b>	Percentage of Change		50 %	No Changes Made		New Course		
<b>* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.</b>								

<b>COURSE OUTCOMES:</b>										<b>K LEVEL</b>
<b>After studying this course, the students will be able to:</b>										
<b>CO1</b>	Understand the advanced concepts of Java Programming									<b>K1,K2</b>
<b>CO2</b>	Understand JDBC and RMI concepts									<b>K2,K3</b>
<b>CO3</b>	Apply and analyze Java in Database									<b>K3,K4</b>
<b>CO4</b>	Handle different event in java using the delegation event model, event listener and class									<b>K5</b>
<b>CO5</b>	Design interactive applications using Java Servlet, JSP and JDBC									<b>K5,K6</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>										
<b>MAPPING WITH PROGRAM OUTCOMES:</b>										
<b>CO/PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>S- STRONG</b>			<b>M – MEDIUM</b>				<b>L - LOW</b>			

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>15</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100</b>	<b>93.3</b>	<b>100</b>	<b>100</b>	<b>93.3</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>ADVANCED JAVA PROGRAMMING</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	Java Basics Review: Components and event handling–Threading concepts–Networking features – Mediatechniques	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>II</b>	Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation- Object Serialization-Java Spaces	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>III</b>	JavainDatabases-JDBCprinciples–databaseaccess-Interacting-databasesearch–Creating multimedia databases – Database support in web applications	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>IV</b>	Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client-Reading http request header-sending data to a client and writingthe http response header-working with cookies Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page- Expressions- Scriptlets-Directives-Declarations-A complete example	<b>16</b>	<b>LCD, CHALK &amp; TALK</b>
<b>V</b>	JAR file format creation–Internationalization–Swing Programming– Advanced java Techniques	<b>18</b>	<b>LCD, CHALK &amp; TALK</b>
<b>VI</b>	Expert lectures, online seminars –webinars	<b>2</b>	<b>Expert lectures, online seminars – webinars</b>

**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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

<b>Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)</b>						
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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
<b>No. of Questions to be Asked</b>			10		10	10
<b>No. of Questions to be answered</b>			10		5	5
<b>Marks for each question</b>			1		5	8
<b>Total Marks for each section</b>			10		25	40

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

<b>Distribution of Marks with K Level</b>						
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
Marks	<b>10</b>	<b>50</b>	<b>80</b>	<b>140</b>	<b>100</b>	<b>100</b>

**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			<b>PART – A</b>		<b>(10 x 1 = 10 Marks)</b>
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		





# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ADVANCED JAVA PROGRAMMING LAB			
<b>Course Code</b>	23PCSCP21	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	CORE	-	4	3

#### COURSE OBJECTIVES:

The main objectives of this course are to:

- To enable the students to implement the simple programs using JSP, JAR
- To provide knowledge on using Servlets, Applets
- To introduce JDBC and navigation of records
- To understand RMI & its implementation
- To introduce to Socket programming.

#### LIST OF PROGRAMS

**90**

1. Display a welcome message using Servlet.
2. Design a Purchase Order for using Html for mand Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order for using Html form and JSP.
5. Prepare a Employee pays lip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.
7. Write a program using Java servlet to handle form data.
8. Write a simple Servlet program to create able of all the header sit receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build as imple Client Server application using RMI.
11. Create an applet for a calculator application.
12. Program to send a text message to another system and receive the text message from the system (usesocket programming).

**Total Lecture Hours 90**

**BOOKS FOR STUDY:**

- Jamie Jaworski, "Java Unleashed", SAMSTechmedia Publications, 1999.
- Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 1999.

**BOOKS FOR REFERENCES:**

- Jim Keogh, "The Complete Reference J2EE", Tata Mc Graw Hill Publishing Company Ltd, 2010.
- David Sawyer McFarland, "Java Script And JQuery-The Missing Manual", O'Reilly Publications, 3rd Edition, 2011.

**WEB RESOURCES:**

- ❖ <https://www.javatpoint.com/servlet-tutorial>
- ❖ <https://www.tutorialspoint.com/java/index.htm>
- ❖ [https://onlinecourses.nptel.ac.in/noc19\\_cs84/preview](https://onlinecourses.nptel.ac.in/noc19_cs84/preview)

<b>Nature of Course</b>	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
<b>Curriculum Relevance</b>	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
<b>Changes Made in the Course</b>	Percentage of Change		60%	No Changes Made		-	New Course	
<b>* Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.</b>								

COURSE OUTCOMES:										K LEVEL
After studying this course, the students will be able to:										
CO1	Understand to the implement concepts of Java using HTML forms, JSP&JAR									K1,K2
CO2	Must be capable of implementing JDBC and RMI concepts									K3,K4
CO3	Able to write Applets with Event handling mechanism									K4,K5
CO4	To Create interactive web based applications using servlets and jsp									K5,K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create										
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	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
<b>S- STRONG</b>			<b>M – MEDIUM</b>				<b>L - LOW</b>			

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>15</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>100%</b>	<b>93%</b>	<b>93%</b>	<b>100%</b>	<b>100%</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>ADVANCED JAVA PROGRAMMING LAB</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<ol style="list-style-type: none"> <li>1. Display a welcome message using Servlet.</li> <li>2. Design a Purchase Order for musing Html for mand Servlet.</li> <li>3. Develop a program for calculating the percentage of marks of a student using JSP.</li> <li>4. Design a Purchase Order for musing Html form and JSP.</li> <li>5. Prepare a Employee pays lip using JSP.</li> <li>6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.</li> <li>7. Write a program using Java servlet to handle form data.</li> <li>8. Write a simple Servlet program to create able of all the header sit receives along with their associated values.</li> <li>9. Write a program in JSP by using session object.</li> <li>10. Write a program to build as imply Client Server application using RMI.</li> <li>11. Create an applet for a calculator application.</li> <li>12. Program to send a text message to another system and receive the text message from the system (use socket programming).</li> </ol>		<b>90</b>	<b>LCD, HANDS ON TRAINING</b>

**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	K3		5			
	CO3	K4			5		
	CO4	K5, K6				5	
	CO5	K2					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	2					2	8	8
	K2		3				3	12	12
	K3			5			5	20	20
	K4				5		5	20	20
	K5					5	5	20	20
	K6					5	5	20	20
	Marks	2	3	5	5	10	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

**K5-** Evaluating, Justifying the problems with solutions

**K6-** Creating solutions for applications

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	6				
2	CO2	K3		15			
3	CO3	K4			15		
4	CO4	K5, K6				15	
5	CO5	K2					9
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			3	7.5	7.5	7.5	4.5
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	6					6	8	8
K2		9				9	12	12
K3			15			15	20	20
K4				15		15	20	20
K5					15	6	20	20
K6					15	9	20	20
Marks	6	9	15	15	30	75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING			
<b>Course Code</b>	23PCSEC21	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	ELECTIVE	4	-	3
<b>COURSE OBJECTIVES:</b> The main objectives of this course are to: <ul style="list-style-type: none"><li>➤ Enable the students to learn the basic functions of AI, Heuristic Search Techniques.</li><li>➤ Provide knowledge on concepts of Representations and Mappings and Predicate Logic.</li><li>➤ Introduce Machine Learning with respect Data Mining, Big Data and Cloud.</li><li>➤ Study about Applications &amp; Impact of ML.</li></ul>				
<b>UNIT - I INTRODUCTION</b>		<b>12 Hours</b>		
Introduction: AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search				
<b>UNIT - II SEARCH TECHNIQUES</b>		<b>12 Hours</b>		
Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings - Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.				
<b>UNIT - III PREDICATE LOGIC</b>		<b>12 Hours</b>		
Using Predicate logic: Representing simple facts in logic - Representing Instance and Isa relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming -Forward Vs Backward reasoning - Matching-Control knowledge.				
<b>UNIT - IV MACHINE LEARNING</b>		<b>10 Hours</b>		
Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context- Approaches to Machine Learning.				
<b>UNIT - V APPLICATIONS OF MACHINE LEARNING</b>		<b>12Hours</b>		
Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle.				
<b>UNIT – VI Contemporary</b>		<b>2 Hours</b>		
Expert lectures, on line seminars –webinars				
<b>Total Lecture Hours</b>				<b>60 hours</b>

**BOOKS FOR STUDY:**

- Elaine Richard Kevin Knight, "Artificial Intelligence", Tata Mc GrawHill Publishers company Pvt Ltd, Second Edition, 1991.
- George FLuger, "Artificial Intelligence", 4th Edition, Pearson Education Publ, 2002.

**BOOKS FOR REFERENCES:**

- Machine Learning for Dummies®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

**WEB RESOURCES:**

- ❖ <https://www.ibm.com/downloads/cas/GB8ZMQZ3>
- ❖ <https://www.javatpoint.com/artificial-intelligence-tutorial>
- ❖ <https://nptel.ac.in/courses/106/105/106105077/>

<b>Nature of Course</b>	EMPLOYABILITY			SKILL ORIENTED	✓	ENTREPRENEURSHIP		
<b>Curriculum Relevance</b>	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
<b>Changes Made in the Course</b>	Percentage of Change		100 %	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
<b>On the successful completion of the course, student will be able to:</b>										
<b>CO1</b>	Demonstrate AI problems and techniques									<b>K1,K2</b>
<b>CO2</b>	Understand machine learning concepts									<b>K2,K3</b>
<b>CO3</b>	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning									<b>K3,K4</b>
<b>CO4</b>	Analyze the impact of machine learning on applications									<b>K4,K5</b>
<b>CO5</b>	Analyze and design are al world problem for implementation and understand the dynamic behavior of a system									<b>K5,K6</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>										
Mapping with Programming Outcomes										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>
<b>S- STRONG</b>			<b>M – MEDIUM</b>				<b>L - LOW</b>			

**CO / PO MAPPING:**

<b>COS</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO 1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CO 4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO 5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>WEITAGE</b>	<b>14</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>14</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>93.3</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>93.3</b>

**LESSON PLAN:**

<b>UNIT</b>	<b>ARTIFICIAL INTELLIGENCE &amp; MACHINE LEARNING</b>	<b>HRS</b>	<b>PEDAGOGY</b>
<b>I</b>	Introduction: AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search	<b>15</b>	<b>LCD &amp; CHALK &amp; TALK</b>
<b>II</b>	Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings - Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	<b>15</b>	<b>LCD &amp; CHALK &amp; TALK</b>
<b>III</b>	Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	<b>13</b>	<b>LCD &amp; CHALK &amp; TALK</b>
<b>IV</b>	Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	<b>15</b>	<b>LCD &amp; CHALK &amp; TALK</b>
<b>V</b>	Looking Inside Machine Learning :The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle	<b>12</b>	<b>LCD &amp; CHALK &amp; TALK</b>
<b>VI</b>	Contemporary Issues	<b>2</b>	<b>Expert lectures, on line seminars – webinars</b>



**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 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
AII	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
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			16	16	28.57	57.1
	K5			16	16	28.57	
	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

**K5-** Evaluating, Justifying the problems with solutions.

**K6-** Combining the solutions with applications.

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

<b>Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)</b>						
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-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
<b>No. of Questions to be Asked</b>			10		10	10
<b>No. of Questions to be answered</b>			10		5	5
<b>Marks for each question</b>			1		5	8
<b>Total Marks for each section</b>			10		25	40
<b>(Figures in parenthesis denotes, questions should be asked with the given K level)</b>						

<b>Distribution of Marks with K Level</b>						
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			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
<b>Marks</b>	<b>10</b>	<b>50</b>	<b>80</b>	<b>140</b>	<b>100</b>	<b>100</b>
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>						

## Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer ALL the questions				<b>PART – A</b>	
				<b>(10 x 1 = 10 Marks)</b>	
1.	<b>Unit - I</b>	<b>CO1</b>	<b>K1</b>		
				a)	b)
				c)	d)
2.	<b>Unit - I</b>	<b>CO1</b>	<b>K2</b>		
				a)	b)
				c)	d)
3.	<b>Unit - II</b>	<b>CO2</b>	<b>K1</b>		
				a)	b)
				c)	d)
4.	<b>Unit - II</b>	<b>CO2</b>	<b>K2</b>		
				a)	b)
				c)	d)
5.	<b>Unit - III</b>	<b>CO3</b>	<b>K1</b>		
				a)	b)
				c)	d)
6.	<b>Unit - III</b>	<b>CO3</b>	<b>K2</b>		
				a)	b)
				c)	d)
7.	<b>Unit - IV</b>	<b>CO4</b>	<b>K1</b>		
				a)	b)
				c)	d)
8.	<b>Unit - IV</b>	<b>CO4</b>	<b>K2</b>		
				a)	b)
				c)	d)
9.	<b>Unit - V</b>	<b>CO5</b>	<b>K1</b>		
				a)	b)
				c)	d)
10.	<b>Unit - V</b>	<b>CO5</b>	<b>K2</b>		
				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			
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	K5		
OR					
19. b)	Unit - IV	CO4	K5		
20. a)	Unit - V	CO5	K6		
OR					
20. b)	Unit - V	CO5	K6		



# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

## DEPARTMENT OF COMPUTER SCIENCE

### FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

<b>Course Name</b>	DATA MINING LAB USING R			
<b>Course Code</b>	23PCSSP21	<b>L</b>	<b>P</b>	<b>C</b>
<b>Category</b>	NME	-	2	2
<b>COURSE OBJECTIVES:</b>				
The main objectives of this course are to:				
<ul style="list-style-type: none"><li>➤ To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression....</li><li>➤ To understand &amp; write programs using the DM algorithms</li><li>➤ To apply statistical interpretations for the solutions</li><li>➤ Able to use visualizations techniques for interpretations</li></ul>				
<b>LIST OF PROGRAMS</b>				<b>30hours</b>
<ol style="list-style-type: none"><li>1. Implement Apriori algorithm to extract association rule of data mining.</li><li>2. Implement k-means clustering technique.</li><li>3. Implement any one Hierarchal Clustering.</li><li>4. Implement Classification algorithm.</li><li>5. Implement Decision Tree.</li><li>6. Linear Regression.</li><li>7. Data Visualization.</li></ol>				
<b>Total Lecture Hours</b>				<b>30 hours</b>
<b>BOOKS FOR STUDY:</b>				
<ul style="list-style-type: none"><li>➤ MargarethH.Dunham,“Data Mining:Introductory and Advanced Topics”,Pearson education,2003</li><li>➤ C.S.R. Prabhu, “Data Warehousing Concepts,Techniques, Productsand Applications”, PHI,Second Edition</li></ul>				
<b>BOOKS FOR REFERENCES:</b>				
<ul style="list-style-type: none"><li>➤ ArunK.Pujari,“Data Mining Techniques”,Universities Press(India)Pvt. Ltd.,2003</li><li>➤ Alex Berson, Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”,TMCH, 2001</li></ul>				
<b>WEB RESOURCES:</b>				
<ul style="list-style-type: none"><li>❖ <a href="https://www.javatpoint.com/data-warehouse">https://www.javatpoint.com/data-warehouse</a></li><li>❖ <a href="https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/">https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/</a></li><li>❖ <a href="https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html">https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html</a></li></ul>				

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

<b>COURSE OUTCOMES:</b>	<b>K LEVEL</b>
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<b>After studying this course, the students will be able to:</b>		
<b>CO1</b>	Able to write programs using R for Association rules, Clustering techniques	<b>K1,K2</b>
<b>CO2</b>	To implement data mining techniques like classification, prediction	<b>K2,K3</b>
<b>CO3</b>	Able to use different visualizations techniques using R	<b>K4,K5</b>
<b>CO4</b>	To apply different data mining algorithms to solve real world applications	<b>K5,K6</b>
<b>CO5</b>	Able to write programs using R for Association rules, Clustering techniques	<b>K1,K2</b>

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

<b>CO / PO MAPPING:</b>
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COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	2	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	2	3	3	3
CO 5	3	3	3	3	3
<b>WEITAGE</b>	<b>14</b>	<b>14</b>	<b>13</b>	<b>15</b>	<b>15</b>
<b>WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS</b>	<b>93%</b>	<b>93%</b>	<b>93%</b>	<b>100%</b>	<b>100%</b>

**LESSON PLAN:**

S. No.	DATA MINING LAB USING R	HRS	PEDAGOGY
1	Implement Apriori algorithm to extract association rule of data mining.	<b>30</b>	<b>Hands on Training</b>
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.		

**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	K3		5			
	CO3	K4			5		
	CO4	K5, K6				5	
	CO5	K2					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	2					2	8	8
	K2		3				3	12	12
	K3			5			5	20	20
	K4				5		5	20	20
	K5					5	5	20	20
	K6					5	5	20	20
	Marks		2	3	5	5	10	25	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

**K5-**Evaluating, Justifying the problems with solutions

**K6-**Creating solutions for applications

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	6				
2	CO2	K3		15			
3	CO3	K4			15		
4	CO4	K5, K6				15	
5	CO5	K2					9
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			3	7.5	7.5	7.5	4.5
Total Marks for each section			15	15	15	15	15



<b>Distribution of Marks with K Level</b>								
<b>K Level</b>	<b>Syntax &amp; Semantics</b>	<b>Programming principles</b>	<b>Concept Applications</b>	<b>Coding</b>	<b>Debugging &amp; Output</b>	<b>Total Marks</b>	<b>% of (Marks without choice)</b>	<b>Consolidated %</b>
<b>K1</b>	<b>6</b>					<b>6</b>	<b>8</b>	<b>8</b>
<b>K2</b>		<b>9</b>				<b>9</b>	<b>12</b>	<b>12</b>
<b>K3</b>			<b>15</b>			<b>15</b>	<b>20</b>	<b>20</b>
<b>K4</b>				<b>15</b>		<b>15</b>	<b>20</b>	<b>20</b>
<b>K5</b>					<b>15</b>	<b>6</b>	<b>20</b>	<b>20</b>
<b>K6</b>					<b>15</b>	<b>9</b>	<b>20</b>	<b>20</b>
<b>Marks</b>	<b>6</b>	<b>9</b>	<b>15</b>	<b>15</b>	<b>30</b>	<b>75</b>	<b>100</b>	<b>100</b>
<b>NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.</b>								