M.Sc.,COMPUTER SCIENCE

Syllabus

Program Code: PCS

2021-2022 onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Eligibility for Admission

Candidate for admission to Master's degree course in Computer Science should have Higher Secondary (+2) level Mathematics with Bachelor's degree in Computer Science/ Information Technology or BCA of Madurai Kamaraj University or any other University recognized by the Syndicate of Madurai Kamaraj University as equivalent thereto.

Candidate should have passed the Degree with a minimum of 55% marks in Part-III. In case of SC/ST candidates, they should have passed the degree with a minimum of 50% marks in Part-III.

Duration of the course

The duration of the course shall be two academic years comprising four semesters with two semesters in each academic year.

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)

Pattern of the question paper 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 x01= 04 Marks

Part –B
Three short answers questions (answer all) 3 x02= 06 Marks

Part –C
Two questions ('either …. or 'type) 2 x 05=10 Marks

Part –D
Two questions out of three 2 x 10 =20 Marks

Total 40 Marks

The scheme of Examinations:

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

Total	25 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions	10 x01	= 10 Marks

No Unit shall be omitted: not more than two questions from each unit.)

Part –B

Short answer questions (one question from each unit)	5 x02	= 10 Marks

Part –C

Five Paragraph questions (‘either …. or ‘type)	5 x 05	= 25 Marks

(One question from each Unit)

Part –D

Three Essay questions out of five	3 x 10	=30 Marks

(One question from each Unit)

Total	75 Marks

Minimum Marks for a Pass

50% of the aggregate (Internal +Summative Examinations).

No separate pass minimum for the Internal Examinations.

34 marks out of 75 is the pass minimum for the Summative Examinations.

VISION

To empower students of Computer Science Department to be technologically adept, innovative, self-motivated and responsible global citizens possessing human values and enable them to contribute in industrial development innovation, high quality technical education and research with the ever-changing world.

MISSION

- To provide a strong theoretical and practical background across the computer science discipline with an emphasis on software development
- To achieve excellence in the field of computing through quality education and equip the skills in computer science that they need to take up real-world challenges
- To strengthen the Industry-Academia interface that will help the graduates to emerge as leaders in academics or an inspiring revolutionary in entrepreneurship.
- To evolve as a center of excellence in the field of Computer Science for developing technically competent professional with ethical values to serve the needs of industry and society
- To provide quality education to meet the need of profession and society

The 12 Graduate Attributes*:

1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
3. (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading,

writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12. (LL) Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

WA	Graduate Attributes	Caption as
WA1	Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.	**Knowledge Base**
WA2	An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions	**Problem Analysis & Investigation**
WA4	An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.	
WA10	An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.	**Communication Skills & Design**
WA3	An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.	

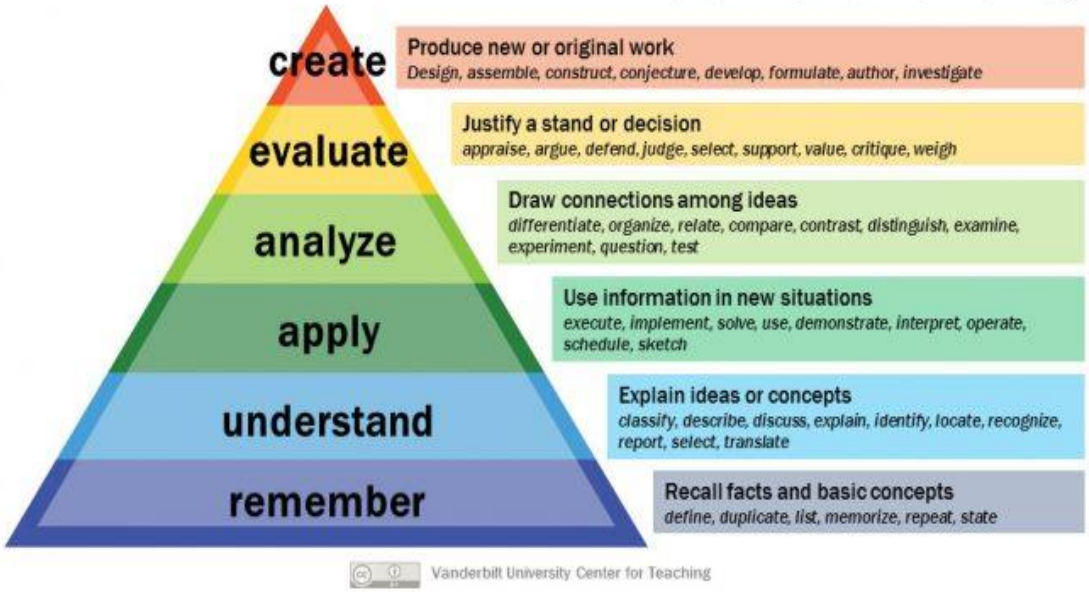
WA9	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.	**Individual and Team Work**
WA6	An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.	**Professionalism, Ethics and equity**
WA8	Ethics and equity: An ability to apply professional ethics, accountability, and equity.	
WA12	**(**An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge	**Life long learning**
WA5	An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.	**Usage of Tools**
WA7	An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.	**Impact on Society**
WA11	An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations	Project Management

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO1:	Graduates of the programme will be employed in the field Computer Science.
PEO2:	Graduates of the programme will pursue higher studies.
PEO3:	Graduates of the programme will apply new technologies in Computer Science to serve the needs of industry, and society.
PEO4:	Graduates of programme will have successful career in technology in Computer Science.
PEO5:	Graduates of the programme will have skills to develop applications with innovation.
PEO6:	Graduates of the programme will be efficient team leaders, effective communicators and capable of working in multi-disciplinary environment following ethical values.

PO NO	PROGRAMME OUTCOMES (POs)	
At the end of the programme, the students will be able to		
PO – 1	Demonstrate the knowledge and understanding of Science concepts and its relevant fields.	**Disciplinary Knowledge**
PO – 2	Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science.	**Problem Solving**
PO – 3	Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science.	**Analytical Reasoning & Critical Thinking**
PO - 4	Communicate the known concepts effectively within the profession and with any forum	**Communication Skills**
PO - 5	Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.	**Team Work and Moral/Ethical Awareness**
PO - 6	Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling	**Digital Literacy & Life-long Learning**

PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO1:	Students to have knowledge and expertise in at least one procedure-oriented and object oriented programming language
PSO2:	Students to have wide perspective on software development including web based applications as well as graphic applications.
PSO3:	Students will be aware of the design principles of Operating Systems specializing on at Least one popular operating System
PSO4:	Students to have the ability to design and implement optimal databases using current technologies.
PSO5:	Students design algorithms as per need by relating the data structure.
PSO6	Students identify and describe the communication networks technologies in local area networks and the internet and counter measures for security threats.

Bloom's Taxonomy



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous), Pasumalai

M.Sc., COMPUTER SCIENCE. Curriculum

(For the student admitted during the academic year 2021-2022 onwards)

Course Code	Title of the Course	Hours	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
21PCSC11	Advanced Web Technology	6	4	25	75	100
21PCSC12	Design and Analysis of Algorithm	6	4	25	75	100
21PCSC13	Operations Research	6	4	25	75	100
21PCSCP1	Advanced Web Technology Lab	6	4	40	60	100
21PCSCP2	Algorithms Lab	6	4	40	60	100
	Total	**30**	**20**	**155**	**345**	**500**
SECOND SEMESTER						
21PCSC21	Advanced Java Programming	6	4	25	75	100
21PCSC22	Object Oriented Analysis and Design	6	4	25	75	100
21PCSC23	Distributed Operating System	6	4	25	75	100
21PCSCP3	Advanced Java Programming Lab	6	4	40	60	100
	Non Major Elective Course					
21PCSNP1	Introduction to Internet	6	6	40	60	100
	Total	**30**	**22**	**155**	**345**	**500**

THIRD SEMESTER						
21PCSC31	Machine Learning	6	4	25	75	100
21PCSC32	Theory of Computation	6	4	25	75	100
21PCSCP4	Machine Learning using Python Lab	6	4	40	60	100
	Elective I					
21PCSE31	Mobile Communication	6	6	25	75	100
21PCSE32	Software Project Management					
21PCSE33	Soft Computing					
	Elective II					
21PCSE34	Embedded Systems	6	6	25	75	100
21PCSE35	Data Mining and DataWare Housing					
21PCSE36	Cyber Security					
	Total	**30**	**24**	**140**	**360**	**500**
FOURTH SEMESTER						
21PCSC41	Big Data Analytics	6	4	25	75	100
21PCSC42	Wireless Sensor Networks	6	4	25	75	100
21PCSCP5	Data mining Lab	6	4	40	60	100
21PCSPR1	Project	6	6	40	60	100
	Elective III					
21PCSE41	Cloud Computing	6	6	25	75	100
21PCSE42	Block Chain Fundamentals					
21PCSE43	Digital Image Processing					
	Total	**30**	**24**	**140**	**360**	**500**
	Grand Total	**120**	**90**	**590**	**1410**	**2000**


FIRST SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**ADVANCED WEB TECHNOLOGY**			
Course Code	**21PCSC11**	**L**	**P**	**C**
Category	**Core**	6	-	4

Nature of course:	**EMPLOYABILITY**	✓	SKILLORIENTED	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- Students are able to develop a dynamic webpage by the use of java script and DHTML
- Students will be able to write a well formed / valid XML document.
- Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
- Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
- Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.

Unit: I	**Web Essentials:**	18 Hours

Clients, Servers, and Communication. The Internet-Basic Internet Protocols The World Wide Web-HTTP request message-response message-Web Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents Case Study.

Unit: II	**Style Sheets : CSS –**	18 Hours

Cascading Style Sheet Features-Core Syntax-Style Sheet and HTML-Style Rule Cascading and Inheritance-Text Properties-Box Model-Colors-Background Image-Normal Flow Box Layout-Beyond the Normal Flow-Other Useful Properties-**Java Script**-Basic Concepts-Variables and Data Types-Operators- Conditional Statement and Loops-Functions-Arrays-Standard Objects-Form Processing in JavaScript-JavaScript Debuggers.

Unit: III	**Host Objects :**	18 Hours

Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling Accommodating Noncompliant Browsers Properties of window-Case Study. **Server-Side Programming:** Java Servlets- Architecture -Overview-A Servelet-Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies- URL Rewriting-Other Capabilities-Data Storage Servelets and Concurrency-Case Study- Related Technologies.

Unit: IV	**Representing Web Data-**	18 Hours

Advantages of XML-Documents and Vocabularies-XML Version and XML Declaration-Namespace-DTD-Introduction to DOM and SAX-DOM based XML Processing-Event Oriented Parsing: SAX – XSLT: Displaying XML Documents in Browsers-Displaying XML Documents in Browser using CSS-**Separating Programming and Presentation –** The Problem with Servlet-The Anatomy of JSP Page-Working of JSP-JSP Application Design with MVC

Unit: V	**Web Services –**	18 Hours

Concept of web services-installation of a JWSDP-writing the Web-Service-Writing a java Web service client- WSDL-XML Schema-SOAP-Storing java Objects as files-Databases and Java Servlets.

	Total Lecture Hours	90 Hours

Books for Study:

1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

Books for Reference:

1. C.Xavier, World Wide Web Design with HTML, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2000.
2. N.P. Gopalan and J. Akilandeswari, Web Technology: A Developer's Perspective, PHI Learning Private Limited, Delhi, Second Edition,2014.

Web Reference

1. **https://www.geeksforgeeks.org/web-technology/**
2. **https://www.goodcore.co.uk/blog/web-technologies/**
3. **https://en.wikibooks.org/wiki/Introduction_to_Information_Technology/Web_Technologies**
4. **https://nptel.ac.in/courses/106/105/106105084/**
5. **https://freevideolectures.com/course/3140/internet-technologies**

COURSE OUTCOMES:		**K Level**
At the end of the Course the students will be able to		
CO1:	Understand the basic concepts of internet, internet standards and protocols.	**K3**
CO2:	Develop a dynamic webpage by the use of java script and DHTML.	**K3**
CO3:	Analyze, identify and define the technology required to build and implement a website	**K4**
CO4:	Implement a web page using development tools to design a webpage	**K4**
CO5:	Design a dynamic webpage.	**K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	2	2	3
CO 2	3	2	3	2	3	2
CO 3	2	1	3	3	3	3
CO 4	2	3	3	2	2	2
CO 5	3	3	2	3	3	3

***3** –Advanced Application; **2** – Intermediate Development; **1** - Introductory Level

LESSON PLAN

UNIT	AVANCED WEB TECHNOLOGIES	Hrs	Mode
I	Web Essential -Markup Languages-Tables-Forms-Frames	18	Chalk & Talk, PPT
II	Style Sheets : CSS – Java Script-Variables and Data Types-Operators-Conditional Statement and Loops-Functions-Arrays- -JavaScript Debuggers.	18	Chalk & Talk, PPT
III	Host Objects - Server Side Programming- Servlets - HTTP-GET and POST Request-Session Tracking Techniques- Database Connectivity	18	Chalk & Talk, PPT
IV	Representing Web Data- XML Documents in Browser using CSS-Separating Programming and Presentation -Working of JSP-JSP Application Design with MVC	18	Chalk & Talk, PPT
V	Web Services – Concept of web services-installation of a JWSDP-writing the Web-Service-Writing a java Web service client- WSDL-XML Schema-SOAP-Storing java Objects as files.	18	Chalk & Talk, PPT

Course Designed by: **Dr.S.Shaik Parveen & Dr.G.Devika**

Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section C**	**Section D**
			MCQs		**Short Answers**		**Either or Choice**	**Open Choice**
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**		
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4	16
K2	5	10	-	-	15	12	
K3	-	-	30	20	50	41.67	42
K4	-	-	20	30	50	41.67	42
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**DESIGN AND ANALYSIS OF ALGORITHM**				
Course Code	**21PCSC12**			**L**	**P**	**C**
Category	**Core**			6	-	4
Nature of course:	EMPLOYABILITY	**SKILL ORIENTED** ✓	ENTREPRENEURSHIP			

COURSE OBJECTIVES:

- To provide mathematical approach for Analysis of Algorithms
- To solve problems using various strategies
- To analyze strategies for solving problems not solvable in polynomial time.
- To Conceptualize and design efficient and effective algorithmic solutions for different real world problems.
- To understand the variations among tractable and intractable problems.

Unit: I	**Fundamentals of Algorithm**:	18 Hours

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms

Unit: II	**Brute Force and Exhaustive Search:**	18 Hours

Brute Force – Selection sort and Bubble Sort-Closest-Pair and Convex-Hull Problems-Exhaustive Search - Divide and conquer methodology – Merge sort – Quick sort – Binary Tree Traversal and Related Properties– Multiplication of Large Integers – Strassen‟s Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

Unit: III	**Dynamic Programming:**	18 Hours

Three basic examples- Knapsack Problem and Memory functions- Optimal Binary Search Trees-Warshall‟s and Floyd‟ algorithm.

Unit: IV	**Greedy Technique**:	18 Hours

Prim‟s algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees and codes. Iterative Improvement: The Simplex Method-The Maximum-Flow Problem

Unit: V	**Limitations of Algorithm Power**:	18 Hours

Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems- Challenges of Numerical Algorithms. **Coping with the Limitations of Algorithm power**: Approximation Algorithms for NP Hard Problems – Algorithms for Solving Nonlinear Equations.

	Total Lecture Hours	90

Books for Study:

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
Unit I : Chapter 1 , Chapter 2
Unit II : Chapter 3.1.3.3, 3.4, Chapter 4
Unit III: Chapter 8,
Unit IV: Chapter 9, 10 .1, 10.2 .
Unit V : Chapter 11.3,11.4,12.3,12.4

Books for Reference:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction

to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008

Web Resources:

1. **http://www2.its.strath.ac.uk/courses/c/**
2. **http://www.stat.cmu.edu/~hseltman/Computer.html**
3. **http://www.princeton.edu/~achaney/tmve/wiki100k/docs/C_%28programming_language%29.html**

COURSE OUTCOMES:		**K Level**
At the end of the Course the students will be able to		
CO1:	Analyze the running time and space complexity of algorithms.	**K3**
CO2:	Describe, apply and analyze the complexity of divide and conquer strategy.	**K3**
CO3:	Describe, apply and analyze the complexity of dynamic programming.	**K4**
CO4:	Apply Greedy Technique for problem solving and identify the computational issues and apply suitable algorithms to solve it effectively.	**K4**
CO5:	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete	**K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	1	3	2	2
CO 2	2	3	2	3	3	3
CO 3	3	2	2	2	2	3
CO 4	2	3	3	3	3	2
CO 5	3	3	3	2	3	3

***3** – Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	DESIGN AND ANALYSIS OF ALGORITHM	Hrs	Mode
I	Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.	18	Black Board/ PPT
II	Brute Force – Selection sort and Bubble Sort-Closest-Pair and Convex-Hull Problems-Exhaustive Search - Divide and conquer methodology – Merge sort – Quick sort – Binary Tree Traversal and Related Properties– Multiplication of Large Integers – Strassen‟s Matrix Multiplication-Closest-Pair and Convex-Hull Problems.	18	Black Board/ PPT
III	Three basic examples- Knapsack Problem and Memory functions- Optimal Binary Search Trees- Warshall‟s and Floyd‟ algorithm .	18	Black Board/ PPT
IV	Greedy Technique– Prim‟s algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees and codes.The Simplex Method-The Maximum-Flow Problem	18	Black Board/ PPT
V	Limitations of Algorithm Power: Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems- Challenges of Numerical Algorithms. Coping with the Limitations of Algorithm power: Approximation Algorithms for NP Hard Problems – Algorithms for Solving Nonlinear Equations.	18	Black Board/ PPT

Course Designed by: **Dr.G.Devika & Dr.S.Shaik Parveen**

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50		**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5		-	-	5	4	**16**
K2	5	10	-	-	15	12	
K3	-	-	30	20	50	41.67	**42**
K4	-	-	20	30	50	41.67	**42**
Marks	**10**	**10**	**50**	**50**	**120**	**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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**OPERATIONS RESEARCH**			
Course Code	**21PCSC13**	**L**	**P**	**C**
Category	**Core**	6	-	4
Nature of Course:	**EMPLOYABILITY** ✓	**SKILL ORIENTED** ✓	**ENTREPRENEURSHIP** ✓	

Course Objectives:

This module aims to introduce students to use quantitive methods and techniques for effective decisions–making, model formulation and applications that are used in solving business decision problems.

Unit: I	**Linear Programming Problem**	15

Linear Programming Problem: Graphical solution : Graphical solution method – Some exceptional cases – General L.P.P. – Canonical and Standard forms of L.P.P. - Simplex method (Problems Only).

Unit: II	**Transportation and Assignment problem**	15

Transportation problem : Introduction -– Initial basic feasible solution: North West Corner Method – Least Cost Method – Vogel's Approximation Method – Test for Optimality - MODI Method - Assignment problem : Introduction – Mathematical formulation of the problem – Solution methods of Assignment Problem: Hungarian method.

Unit: III	**Games and Strategies**	15

Introduction – Two – Person Zero Sum Games – Some Basic Terms - The Maximin – Minimax Principle – Games without saddle Points – graphic Solution of 2 x n and m x 2 games – Dominance Property

Unit: IV	**Network Routing Problems**	15

Introduction– Network notations and Definitions – Minimal Spanning Tree problems – Shortest Route Problems.

Unit: V	**Network scheduling by PERT / CPM**	15

Introduction - Network basic components – Logical sequencing – Rules of Network Constructions – Concurrent Activities - Critical Path Analysis - Probability considerations in PERT

	Total Lecture Hours	**60 Hrs**

Books for Study:

KantiSwarup, P K Guptha and Man Mohan, **"Operations Research"**, Sultan Chand & Sons, New Delhi, Edition, 2013.

Unit I : Chapter 3 – Sections: 3.2, 3.3, 3.4, 3.5
Chapter 4 – Sections: 4.3
Unit II : Chapter 10 – Sections : 10.1, 10.9, 10.13
Chapter 11 – Sections : 11.1, 11.2, 11.3 (4)
Unit III : Chapter 17 – Sections : 17.1, 17.2, 17.3, 17.4,17.5, 17.6, 17.7
Unit IV : Chapter 24– Sections : 24.1, 24(2.2), 24.3, 24.4
Unit V : Chapter 25 – Sections : 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7

Books for References:

1. Hamdy A. Taha, **"Operations Research-An Introduction"**, Macmillan Publishing Co, 5th Edition, 1987.

2. P.K.Gupta, Man Mohan, **"Operations Research and Quantitative Analysis"**, Sultan Chand & Sons, New Delhi First Edition, 1987.		
Web Resources:		
https://nptel.ac.in/courses/111/107/111107128/https://onlinecourses.swayam2.ac.in/cec20_ma10/preview		
COURSE OUTCOMES:		**K Level**
At the end of the Course the students will be able to		
CO1:	Develop the skills in Mathematical formulation and Solving of LPP.	**K3**
CO2:	Solve specialized LPP like transportation and assignment problems.	**K3**
CO3:	Evaluate the challenges in building networks and solutions to those.	**K5**
CO4:	Identify the activities, schedule the Project and finding time of completion Introduce about Network problems.	**K3**
CO5:	Distinguish a game situation from a pure individual's decision problem	**K4**

CO & PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	**3**	**3**	**3**	**2**	**2**	**2**
CO 2	**3**	**2**	**3**	**2**	**2**	**3**
CO 3	**3**	**3**	**3**	**2**	**3**	**2**
CO 4	**3**	**2**	**2**	**3**	**3**	**2**
CO 5	**3**	**2**	**3**	**3**	**3**	**3**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction – Linear Programming Problem – Graphical solution : Graphical solution method – Some exceptional cases – General L.P.P. – Canonical and Standard forms of L.P.P. - Simplex method (Problems Only).	**15**	**Chalk & Talk**
II	Transportation problem : Introduction -– Initial basic feasible solution: North West Corner Method – Least Cost Method – Vogel's Approximation Method – Test for Optimality - MODI Method - Assignment problem : Introduction – Mathematical formulation of the problem – Solution methods of Assignment Problem: Hungarian method.	**15**	**Chalk & Talk**
III	Introduction – Two – Person Zero Sum Games – Some Basic Terms - The Maximin – Minimax Principle – Games without saddle Points – graphic Solution of 2 x n and m x 2 games – Dominance Property	**15**	**Chalk & Talk**
IV	Introduction – Network notations and Definitions – Minimal Spanning Tree problems – Shortest Route Problems.	**15**	**Chalk & Talk**
V	Introduction - Network basic components – Logical sequencing – Rules of Network Constructions – Concurrent Activities - Critical Path Analysis - Probability considerations in PERT	**15**	**Chalk & Talk**

Course Designed by: **Dr. P. Visvanathan**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A** **MCQs**		**Section B** **Short Answers**		**Section C** **Either or Choice**	**Section D** **Open Choice**
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**		
CI **AI**	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI **AII**	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**3**		**4**	**2**
		No. of Questions to be answered	**4**		**3**		**2**	**1**
		Marks for each question	**1**		**2**		**5**	**10**
		Total Marks for each section	**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K1	2	K1	1	K1	2 (K3& K3)	1 (K2)
2	CO 2	K3	2	K1	1	K1	2 (K3 &K3)	1 (K3)
3	CO 3	K3	2	K1&K2	1	K2	2 (K3 &K4)	1 (K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K3 &K4)	1 (K3)
5	CO 5	K4	2	K1&K2	1	K2	2 (K3 &K4)	1 (K4)
No. of Questions to be Asked			10		5		5	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	6	10	-	19	15.83	42
K2	5	4	10	10	31	25.83	
K3	-	-	20	30	50	41.67	42
K4	-	-	10	10	20	16.67	16
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K3	
2	CO1	K2	
3	CO2	K3	
4	CO2	K2	
5	CO3	K3	
6	CO3	K2	
7	CO4	K3	
8	CO4	K2	
9	CO5	K2	
10	CO5	K3	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K3	
14	CO4	K3	
15	CO5	K3	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K2	
18) a	CO3	K3	
18) b	CO3	K2	
19) a	CO4	K2	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
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Course Name	**ADVANCED WEB TECHNOLOGY LAB**			
Course Code	**21PCSCP1**	**L**	**P**	**C**
Category	**Core**	**-**	**6**	**4**

Nature of Course:	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

Course Objectives:

- To understand the web technologies to create adaptive web pages for web application.
- To know the concept and implementation of cookies as well as related privacy concerns.
- Understand the web technologies to create adaptive web pages for web application.
- Use CSS to implement a variety of presentation effects to the web application
- Know the concept and implementation of cookies as well as related privacy concern

S. No.	List of Programs	Hours
1.	Write an HTML code to display your profile on a web page. Create a table to show your class time-table.	90
2.	Insert an image and create a link such that clicking on image takes user to other page	
3.	Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web	
4.	pages for the three links.	
5.	Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credential.	
6.	Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.	
7.	Write a JavaScript program to count the number of vowels in a given string.	
8.	Write a java script program to test the first character of a string is uppercase or not.	
9.	Write a pattern that matches e-mail addresses.	
10.	To write a program that parses an XML document using DOM and SAX parsers.	
11.	To write a XML program and DTD for a document.	
12.	Create a web page with some text in using some color. Change the color of the text on click of a button or on mouse over.	
13.	Client-side scripts for validating web form controls Using DHTML To write a XML program for creating a cd catalog.	
14.	To create an html page, and to apply style formatting using external Cascading Style Sheet.	
15.	To write a servlet program using HTTP Servlet.	
	Total Lecture Hours	**90**

Books for Reference: 1. https://www.w3schools.com/html/html_exercises.asp 2. https://www.w3resource.com/javascript-exercises/ 3. https://www.javatpoint.com/dhtml	
Web Reference **1. https://nptel.ac.in/courses/106/105/106105084/** **2. https://freevideolectures.com/course/3140/internet-technologies**	
COURSE OUTCOMES:	**K Level**
At the end of the Course the students will be able to	
CO1: Understand best technologies for solving web client/server problems	**K2**
CO2: Analyze and design real time web applications	**K4**
CO3: To have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.	**K3**
CO4: To develop a Web site using text, images, links, lists, and tables for navigation and layout.	**K4**
CO5: To create web applications using web controls.	**K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	3	3	3	3
CO 2	2	1	2	3	3	3
CO 3	3	3	3	2	2	3
CO 4	1	2	2	1	3	2
CO 5	3	2	3	2	3	2

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –**Introductory Level

LESSON PLAN

S. No.	List of Programs	Hrs	Mode
1.	Write an HTML code to display your profile on a web page.	90	Lab Demonstration
2.	Create a table to show your class time-table.		
3.	Insert an image and create a link such that clicking on image takes user to other page		
4.	Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.		
5.	Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credential.		
6.	Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.		
7.	Write a JavaScript program to count the number of vowels in a given string.		
8.	Write a java script program to test the first character of a string is uppercase or not.		
9.	Write a pattern that matches e-mail addresses.		
10.	To write a program that parses an XML document using DOM and SAX parsers.		
11.	To write a XML program and DTD for a document.		
12.	Create a web page with some text in using some color. Change the color of the text on click of a button or on mouse over.		
13.	Client-side scripts for validating web form controls Using DHTML		
14.	To write a XML program for creating a cd catalog.		
15.	To create an html page, and to apply style formatting using external Cascading Style Sheet. To write a servlet program using HTTP Servlet.		

Course Designed by: **Dr.S.Shaik Parveen & Dr.G.Devika**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
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Course Name	**ALGORITHMS LAB**			
Course Code	**21PCSCP2**	**L**	**P**	**C**
Category	**Core**	-	6	4

Nature of Course:	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- Design and implement various algorithms in programming
- Employ various design strategies for problem solving.
- Measure and compare the performance of different algorithms
- Demonstrate a familiarity with major algorithms
- Apply important algorithmic design paradigms and methods of analysis.

S. No.	**List of Programs**	**Hours**
1.	Write program to perform Mathematical analysis for Recursive algorithm.	**90**
2.	Write program to perform Mathematical analysis Non-recursive algorithm.	
3.	Write program to Sort a given set of n integer elements using Quick Sort method and compute its time complexity analysis: worst case, average case and best case.	
4.	Write program to Sort a given set of n integer elements using Merge Sort method and compute its time complexity analysis: worst case, average case and best case.	
5.	Write program to implement Binary Tree Traversal	
6.	Write program to Implement the 0/1 Knapsack problem using Dynamic Programming method.	
7.	Write program to Implement the 0/1 Knapsack problem using Greedy method.	
8.	Write program, From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	
9.	Write program to Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal'salgorithm.	
10.	Write program to Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm..	
11.	Write program to implement All-Pairs Shortest Paths problem using Floyd's algorithm.	
12.	Write program to Implement Travelling Sales Person problem using Dynamic programming.	
13.	Write program to Design and implement to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d	
14.	Write program Design and implement program to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.	
15	Write program Design and implement program for N-Queen's Problem using backtracking principle.	

	Total Lecture Hours	**90**
Web Reference: **https://online.stanford.edu/courses/cs161-design-and-analysis-algorithms** **https://www.classcentral.com/course/swayam-design-and-analysis-of-algorithms-3984**		
COURSE OUTCOMES:		**K Level**
At the end of the Course the students will be able to		
CO1:	Design algorithms using appropriate design	**K2**
CO2:	Implement a variety of algorithms such assorting, graph related, combinatorial in a high level language	**K4**
CO3:	Develop solutions for Greedy method, Dynamic Programming	**K3**
CO4:	Apply and implement learned algorithm design techniques to solve real-world problems	**K4**
CO5:	Analyze and compare the performance of algorithms using different features	**K4**

CO & PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	3	2	2	3
CO 2	2	2	2	3	3	2
CO 3	2	2	3	3	1	3
CO 4	3	3	3	1	3	3
CO 5	3	2	3	3	3	3

***3** –Advanced Application; **2** – Intermediate Development; **1** –Introductory Level

LESSON PLAN

S. No.	List of Programs	Hrs	Mode
1.	Write program to perform Mathematical analysis for Recursive algorithm.	90	Lab Demonstration
2.	Write program to perform Mathematical analysis Non-recursive algorithm.		
3.	Write program to Sort a given set of n integer elements using Quick Sort method and compute its time complexity analysis: worst case, average case and best case.		
4.	Write program to Sort a given set of n integer elements using Merge Sort method and compute its time complexity analysis: worst case, average case and best case.		
5.	Write program to implement Binary Tree Traversal		
6.	Write program to Implement the 0/1 Knapsack problem using Dynamic Programming method.		
7.	Write program to Implement the 0/1 Knapsack problem using Greedy method.		
8.	Write program, From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.		
9.	Write program to Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal'salgorithm.		
10.	Write program to Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm..		
11.	Write program to implement All-Pairs Shortest Paths problem using Floyd's algorithm.		
12.	Write program to Implement Travelling Sales Person problem using Dynamic programming.		
13.	Write program to Design and implement to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d		
14.	Write program Design and implement program to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.		
15	Write program Design and implement program for N-Queen’s Problem using backtracking principle.		

Course Designed by: **Dr.G.Devika & Dr.S.Shaik Parveen**


SECOND SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**ADVANCED JAVA PROGRAMMING**				
Course Code	**21PCSC21**		**L**	**P**	**C**
Category	**Core**		6	-	4
Nature of Course:	**EMPLOYABILITY**	✓ SKILLORIENTED	ENTREPRENEURSHIP		

COURSE OBJECTIVES:

- To learn how to use Core Java Technologies.
- To implement OOP Concept.
- To get knowledge in Classes, Fundamentals, Methods, Constructors and Garbage Collections.
- To analyze the current Thread and Synchronization.
- To cover Applet, AWT Controls, Swing and Java Beans.

Unit: I	The Genesis of Java: Java's Lineage -	18 Hours

Why java is important to Internet - Java's Magic - The Java Buzz words. An overview of Java: Object-Oriented Programming - Data types, Variables and Arrays: Simple type - Variables - Type conversion and casting - Arrays. - Operators: Arithmetic- bit wise - relational - Logical - Assignment – „?“ Operator – Operator Precedence. - Control statements - Selection - Iteration - Jump statements

Unit: II	Introducing Classes: Class fundamentals -	18 Hours

Declaring objects - Introducing methods - Constructors - this keyword - Garbage collection - finalize method. Inheritance: Basics - Using super - Multilevel Hierarchy - Method overriding - Abstract classes - final with inheritance. Packages and Interfaces: Packages - Access protection - Importing Packages - Interfaces. Exception Handling: Fundamentals - types - Uncaught exception - Nested try - throw - throws - finally.

Unit: III	Multithreaded Programming:	18 Hours

Java Thread model - Main thread - creating a thread - Multiple threads - priorities - Synchronization - I/O basics - reading/writing console – PrintWriter class - reading and writing files - The Applet class: Applet Basics – Applet Architecture - Applet Skeleton - Applet display methods - Requesting - repainting - Status window - HTML APPLET tag – Passing parameter to Applets.

Unit: IV	Using AWT Controls,	18 Hours

Layout managers and Menus: Control fundamentals - labels, buttons, check boxes, choice controls, lists, scroll bar, textfield, textarea, layout manager, menubars and menus, dialog boxes - Handling events using AWT components. A tour of Swing: JApplet – Icons and Labels – Buttons – Combo Boxes – Trees – Exploring Swing.

Unit: V	Java Beans: What is a Java Bean? –	18 Hours

Advantages of Java Bean – Application Builder Tools – BDK – JAR Files – Introspection – Developing simple Bean Using BDK – Using Bound Properties – Using BeanInfo Interface – JavaBean API. Servlets: Background – Lifecycle of servlet – Simple servlet – The Servlet API – javax.servlet package – Reading servlet parameters
– javax.servlet.http package – Handling HTTP requests and responses – Cookies – Session tracking.

	Total Lecture Hours	90

Books for Study:

Herbert Schildt, **Java 2 - The Complete Reference**, TMH, New Delhi, 5th Edition, 2005.

Books for Reference:

1. Justin Couch, Daniel H.Steinberg, "J2EE Bible", Wiley India(P) Ltd, NewDelhi, 2002.
2. Paul Tremblett, "Instant Enterprise Java y - Beans", Tata McGraw HillPublishing company, New Delhi,2001.
3. Platt S David, "Introducing Micorsoft .Net", Prentice Hall of India, NewDelhi,2003.

Web Resources:

1. **https://www.w3schools.com/**
2. **https://www.tutorialspoint.com/java**
3. **https://www.geeksforgeeks.org/java/**

COURSE OUTCOMES		**K Level**
At the end of the Course the students will be able to		
CO1	Understand the functionality of the Core Java	**K2**
CO2	Apply the concept of OOP.	**K3**
CO3	Apply and implementation of Thread services**.**	**K4**
CO4	Examine the features of Applet and AWT Various applications	**K4**
CO5	Execute Java Beans and Servlet in development.	**K4**

CO & PO Mapping:

CO's/PO's	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	2	2	2	2
CO2	3	1	3	3	3	3
CO3	2	3	3	2	2	3
CO4	2	2	3	3	1	2
CO5	3	2	2	3	3	2

***3** –Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	ADVANCE JAVA PROGRAMMING	Hrs	Mode
I	The Genesis of Java: Java's Lineage - Why java is important to Internet - Java's Magic - The JavaBuzz words. An overview of Java: Object-Oriented Programming - Data types, Variables and Arrays: Simple type - Variables - Type conversion and casting - Arrays. - Operators: Arithmetic- bit wise - relational - Logical - Assignment – „?‟ Operator – Operator Precedence. - Control statements - Selection - Iteration - Jump statements	18	Lecture and Chalk board instruction
II	Introducing Classes: Class fundamentals - Declaring objects - Introducing methods -Constructors - this keyword - Garbage collection - finalize method. Inheritance: Basics - Using super - Multilevel Hierarchy - Method overriding - Abstract classes - final with inheritance. Packages and Interfaces: Packages - Access protection - Importing Packages - Interfaces.Exception Handling: Fundamentals - types - Uncaught exception - Nested try - throw - throws - finally.	18	Lecture and Chalk board instruction
III	Multithreaded Programming: Java Thread model - Main thread - creating a thread - Multiple threads - priorities - Synchronization - I/O basics - reading/writing console – PrintWriter class - reading and writing files - The Applet class: Applet Basics – Applet Architecture - Applet Skeleton - Applet display methods - Requesting - repainting - Status window - HTML APPLET tag – Passing parameter to Applets.	18	Lecture and Chalk board instruction
IV	Using AWT Controls, Layout managers and Menus: Control fundamentals - labels, buttons, check boxes, choice controls, lists, scroll bar, textfield, textarea, layout manager, menubars and menus, dialog boxes - Handling events using AWT components. A tour of Swing: JApplet – Icons and Labels – Buttons – Combo Boxes – Trees – Exploring Swing.	18	Lecture and Chalk board instruction
V	Java Beans: What is a Java Bean? – Advantages of Java Bean – Application Builder Tools – BDK – JAR Files – Introspection – Developing simple Bean Using BDK – Using Bound Properties – Using BeanInfo Interface – JavaBean API. Servlets: Background – Lifecycle of servlet – Simple servlet – The Servlet API – javax.servlet package – Reading servlet parameters – javax.servlet.http package – Handling HTTP requests and responses – Cookies – Session tracking.	18	Lecture and Chalk board instruction

Course Designed by: **Dr.S.Bharani Sethu Pandian & Mr.P.Ganesh Babu**

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4	16
K2	5	10	-	-	15	12	
K3	-	-	30	20	50	41.67	42
K4	-	-	20	30	50	41.67	42
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**OBJECT ORIENTED ANALYSIS AND DESIGN**			
Course Code	**21PCSC22**	**L**	**P**	**C**
Category	**Core**	6	-	4

Nature of Course:	**EMPLOYABILITY**	✓	SKILL ORIENTED	ENTREPRENEURSHIP

Course Objectives:

- Learn the basics of OO analysis and design skills.
- Learn the UML design diagrams.
- Learn to map design to code.
- Be exposed to the various testing techniques.
- Compare and Contrast the UML Diagrams with ER and Data Flow Diagrams.

Unit: I	**An overview of Object-Oriented systems Development:**	**18**

Introduction - Two Orthogonal Views of the Software - Object-Oriented systems Development Methodology - Why an Object Orientation - Overview of the Unified Approach. **Object Basics:** Introduction - An Object-Oriented Philosophy - Objects - Objects - Objects are Grouped in Classes - Attributes - Object Behavior and Methods - Objects Respond to Messages - Encapsulation and Information Hiding - Class Hierarchy - Polymorphism - Object Relationships and Associations - Aggregations and Object Containment. **Object-Oriented Systems Development Life Cycle:** Introduction - The Software Development Process - Building High-Quality Software.

Unit: II	**Object-Oriented Methodologies:**	**18**

Introduction - survey of some of the Object Oriented Methodologies - Rumbaugh Et al' s Object Modeling Technique - The Booch Methodology - The Jacobson et al. Methodologies - Patterns - Frameworks - The Unified approach. **Unified Modeling Language:** Introduction - Static and Dynamic Models - Why Modelling - Introduction to the Unified Modeling Language - UML Diagrams - UML Class Diagram - Use-Case Diagram - UML Dynamic Modeling - Model Management - UML Extensibility - UML Meta-Model.

Unit: III	**Identifying Use-Cases:**	**18**

Introduction - Why Analysis is a Difficult Activity - Business Object Analysis - Use-Case driven object oriented analysis – Business Process Modelling - Use-Case model – Developing Effective Documentation. **Classification:** Introduction – Classifications Theory – Approaches for Identifying Classes – Noun Phrase Approach – Common Class Patterns Approach – Use-Case Driven Approach – Classes, Responsibilities and Collaborators – Naming Classes.

Unit: IV	**Identifying Object Relationships, Attributes, and Methods:**	**18**

Introduction - Associations - Super–Sub Class Relationships – A-Part-of Relationships-Aggregation – Class Responsibility: Identifying attributes and methods – Defining Attributes by Analyzing Use Cases and Other UML Diagrams – Object Responsibility:Methods and Messages – **The Object-Oriented Design Process and Design Axioms:** Introduction - The Object-Oriented Design Process – The Object-Oriented Design Axioms – Corollaries – Design Patterns.

Unit: V	**Designing Classes:**	**18**

Introduction - The object Oriented Design Philosophy - UML Object Constraint Language - Class visibility – Designing Classes: Refining attributes – Designing Methods and protocols. **Object Storage And Object Interoperability:** Database Management Systems – Logical and Physical Database Organization and Access Control - Distributed Databases and Client-Server Computing -

Distributed Objects Computing: The Next Generation of Client-Server Computing.		
	Total Lecture Hours	**90**

Books for Study:

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008.

Unit I

Chapter 1 - 1.1 to 1.6
Chapter 2 - 2.1 to 2.12
Chapter 3 - 3.1 to 3.3

Unit II

Chapter 4 - 4.1, 4.3 to 4.8
Chapter 5 - 5.2, 5.5 to 5.10

Unit III

Chapter 6- 6.1 - 6.7
Chapter 7 - 7.1 to 7.8

Unit IV

Chapter 8- 8.1 to 8.4, 8.6, 8.7, 8.9
Chapter 9 - 9.1 to 9.5

Unit V

Chapter 10 - 10.1 - 10.6,10.8
Chapter 11 - 11.3, 11.5

Books for Reference:

1. Craig Larman, "Applying UML and Patterns", Second Edition, Pearson Education, 2002.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Long man, 1999.
3. Bernd Bruegge, Allen H. Dutoit, "Object Oriented Software Engineering using UML, Patterns and Java", Pearson Education, 2004.

Web Reference

1. **https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_uml_analysis_model.htm**
2. **https://www.powershow.com/view4/49c3e1-ZTQ2O/Object-Orientation_Concepts_UML_and_OOAD_powerpoint_ppt_presentation**

COURSE OUTCOMES:		**K Level**
At the end of the Course the students will be able to		
CO1:	Describe the modeling concept for object oriented development in the system.	**K3**
CO2:	Apply the concept of domain and application analysis for designing UML Diagrams.	**K3**
CO3:	Classify the different classes based on the classification theory and its approaches.	**K4**
CO4:	Evaluate the UML models for various development stages of System using the appropriate UML notation.	**K4**
CO5:	Develop and explore the conceptual model into various scenarios and applications.	**K4**

CO & PO Mappings:

CO's/PO's	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	3	3
CO2	2	3	2	3	3	3
CO3	3	3	3	1	3	3
CO4	2	2	3	3	2	2
CO5	3	2	1	3	3	3

***3.** Advanced Applications 2. Intermediate Development 1.Introductory Level

LESSON PLAN

UNIT	OBJECT ORIENTED ANALYSIS AND DESIGN	Hrs	Mode
I	**An overview of Object-Oriented systems Development:** Introduction Two Orthogonal Views of the Software Object-Oriented systems Development Methodology Why an Object Orientation - Overview of the Unified Approach. **Object Basics:** Introduction An Object-Oriented Philosophy Objects are Grouped in Classes - Attributes Object Behavior and Methods Objects Respond to Messages Encapsulation and Information Hiding Class Hierarchy Polymorphism Object Relationships and Associations Aggregations and Object Containment. **Object-Oriented Systems Development Life Cycle:** Introduction The Software Development Process Building High-Quality Software	**18**	**Blackboard & PPT**
II	**Object-Oriented Methodologies:** Introduction survey of some of the Object Oriented Methodologies Rumbaugh Et al' s Object Modeling Technique The Booch Methodology The Jacobson et al. Methodologies Patterns, Frameworks The Unified approach **Unified Modeling Language:** Introduction Static and Dynamic Models Why Modelling, Introduction to the Unified Modeling Language UML Diagrams, UML Class Diagram Use-Case Diagram, UML Dynamic Modeling Model Management, UML Extensibility, UML Meta-Model.	**18**	**Blackboard & PPT**

III	**Identifying Use-Cases:** Introduction Why Analysis is a Difficult Activity Business Object Analysis Use-Case driven object oriented analysis Business Process Modelling Use-Case model Developing Effective Documentation **Classification:** Introduction Classifications Theory, Approaches for Identifying Classes Noun Phrase Approach Common Class Patterns Approach Use-Case Driven Approach Classes, Responsibilities and Collaborators, Naming Classes.	**18**	**Blackboard & PPT**
IV	**Identifying Object Relationships, Attributes, and Methods:** Introduction Associations, Super–Sub Class Relationships A-Part-of Relationships Aggregation, Class Responsibility: Identifying attributes and methods Defining Attributes by Analyzing Use Cases and Other UML Diagrams Object Responsibility:Methods and Messages **The Object-Oriented Design Process and Design Axioms:** Introduction The Object-Oriented Design Process The Object-Oriented Design Axioms Corollaries, Design Patterns.	**18**	**Blackboard & PPT**
V	**Designing Classes:** Introduction The object Oriented Design Philosophy UML Object Constraint Language Class visibility Designing Classes: Refining attributes Designing Methods and protocols. **Object Storage And Object Interoperability:** Database Management Systems Logical and Physical Database Organization and Access Control Distributed Databases and Client-Server Computing Distributed Objects Computing: The Next Generation of Client-Server Computing.	**18**	**Blackboard & PPT**

Course Designed by: **Dr.P.Hemavathy & Dr.M.Karthika**

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AI	**CO2**	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AII	**CO4**	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**3**		**4**	**2**
		No. of Questions to be answered	**4**		**3**		**2**	**1**
		Marks for each question	**1**		**2**		**5**	**10**
		Total Marks for each section	**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4	16
K2	5	10	-	-	15	12	
K3	-	-	30	20	50	41.67	42
K4	-	-	20	30	50	41.67	42
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**DISTRIBUTED OPERATING SYSTEM**			
Course Code	**21PCSC23**	**L**	**P**	**C**
Category	**Core**	6	-	4

Nature of Course:	**EMPLOYABILITY**	✓	SKILL ORIENTED	ENTREPRENEURSHIP

Course Objectives:

- This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- The structure of distributed systems using multiple levels of software is emphasized
- To provide hardware and software issues in modern distributed systems.
- To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

Unit: I	**Introduction:**	18 Hours

What Operating Systems Do? - Computer-System Organization - Computer- System Architecture - Operating-System Structure - Operating-System Operations - Process Management - Memory Management - Storage Management - Protection and Security - Distributed Systems – Special Purpose Systems – Computing environment.

Unit: II	**Distributed Operating Systems:**	18 Hours

Motivation - Types of Distributed Operating Systems - Network Structure - Network Topology - Communication Structure - Communication Protocols – Robustness - Design Issues - An Example: Networking.

Unit: III	**Distributed File Systems:**	18 Hours

Background - Naming and Transparency - Remote File Access - Stateful Versus Stateless Service - File Replication - An Example - Distributed Coordination: Event Ordering - Mutual Exclusion – Atomicity - Concurrency Control - Deadlock Handling - Election Algorithms - Reaching Agreement.

Unit: IV	**Real-Time Systems:**	18 Hours

Overview - System Characteristics - Features of Real-Time Kernels - Implementing Real-Time Operating Systems - Real-Time CPU Scheduling - Multimedia Systems: What Is Multimedia? - Compression - Requirements of Multimedia Kernels - CPU Scheduling - Disk Scheduling - Network Management - An Example.

Unit: V	**The Linux System:**	18 Hours

Linux History - Design Principles - Kernel Modules - Process Management - Scheduling - Memory Management – FileSystems - Input and Output – Inter process Communication - Network Structure – Security - Windows XP: History - Design Principles - System Components -Environmental Subsystems - File System - Networking - Programmer Interface.

	Total Lecture Hours	**90**

Books for Study:

1. Silbersehatz A., Galwin P.B., Greg Gagne, Operating System Principles, 7th Edition, John Wiley Sons, New Delhi, 2005.

Unit I : Chapter 1 (Full)

Unit II : Chapter 14 (Full) Unit III : Chapter 15 (Full) Chapter 16 (Full) Unit IV:Chapter 19 (Full) Chapter 20 (Full) Unit V : Chapter 21 (Full) Chapter 22 (Full)
Books for Reference: 1. A.S.Tanenbaum.., **Modern Operating System**, 2nd Edition, PHI, New Delhi,2007. 2. A.S.Tanenbaum,**Distributed Operating System**, Pearson Education, New Delhi,2005.
Web Reference **1. http://www.tutorialsspace.com/Operating-System/04-Distributed-operating-system.aspx** **2. https://www.ics.uci.edu/~cs230/lectures/DistributedOSintro.pdf** **3. http://www.darshan.ac.in/Upload/DIET/Documents/CE/2160710_Distributed_Operating_System_GTU_Study_Material_2017_22042017_033831AM.pdf** **4. https://www.tutorialspoint.com/operating_system/index.htm**

Course Outcomes		**K Level**
At the end of the Course the students will be able to		
CO1:	Understand the basic concepts of Linux operating system.	**K3**
CO2:	Understand Scheduling of operating system.	**K3**
CO3:	Study I/O management, Memory Management and File System and Distributed Systems	**K4**
CO4:	Understand the system level and support required for Distributed System.	**K4**
CO5:	Learn Synchronization and Deadlock	**K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	2
CO 2	3	3	3	3	1	3
CO 3	2	2	3	2	3	3
CO 4	3	3	2	2	2	3
CO 5	2	3	3	3	2	2

***3** –Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Mode
I	**Introduction:** What Operating Systems Do? - Computer-System Organization - Computer- System Architecture - Operating-System Structure - Operating-System Operations - Process Management - Memory Management - Storage Management - Protection and Security - Distributed Systems – Special Purpose Systems – Computing environment.	18	Chalk & Talk ,ICT
II	**Distributed Operating Systems:** Motivation - Types of Distributed Operating Systems - Network Structure - Network Topology - Communication Structure - Communication Protocols – Robustness - Design Issues - An Example: Networking.	18	Chalk & Talk ,ICT
III	Distributed File Systems: Background - Naming and Transparency - Remote File Access - Stateful Versus Stateless Service - File Replication - An Example - Distributed Coordination: Event Ordering - Mutual Exclusion – Atomicity - Concurrency Control - Deadlock Handling - Election Algorithms - Reaching Agreement	18	Chalk & Talk ,ICT
IV	**Real-Time Systems:** Overview - System Characteristics - Features of Real-Time Kernels - Implementing Real-Time Operating Systems - Real-Time CPU Scheduling - Multimedia Systems: What Is Multimedia? - Compression - Requirements of Multimedia Kernels - CPU Scheduling - Disk Scheduling - Network Management - An Example.	18	Chalk & Talk ,ICT
V	**The Linux System:** Linux History - Design Principles - Kernel Modules - Process Management - Scheduling - Memory Management – FileSystems - Input and Output – Inter process Communication - Network Structure – Security - Windows XP: History - Design Principles - System Components -Environmental Subsystems - File System - Networking - Programmer Interface.	18	Chalk & Talk ,ICT

Course Designed by: **Dr.M.Karthika & Dr.P.Hemavathy**

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**3**		**4**	**2**
		No. of Questions to be answered	**4**		**3**		**2**	**1**
		Marks for each question	**1**		**2**		**5**	**10**
		Total Marks for each section	**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4	16
K2	5	10	-	-	15	12	
K3	-	-	30	20	50	41.67	42
K4	-	-	20	30	50	41.67	42
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**AVANCDED JAVA PROGRAMMING LAB**				
Course Code	**21PCSCP3**		**L**	**P**	**C**
Category	**Core**		-	6	4
Nature of Course:	**EMPLOYABILITY**	✓	SKILL ORIENTED	ENTREPRENEURSHIP	

COURSE OBJECTIVES:

- To get hands on experience in developing applications in OOPS Concepts.
- Learn the basics of Inheritance and its types.
- Experiment the exception handling techniques.
- To implement thread and its types.
- Be exposed to the various advanced java techniques.

S. No.	List of Programs	Hours
1.	OOPS – Class, Objects.	90
2.	OOPS – Polymorphism, Encapsulation.	
3.	Inheritance and types.	
4.	Strings.	
5.	Exception Handling.	
6.	Threads.	
7.	Applets.	
8.	RMI - Invocation of server side methods	
9.	Servlets - Returning Information received from the client.	
10.	Client/Server Programming	
11	JSP - use of java beans.	
12	EJB – Session Bean.	
13	EJB – Entity Bean	
	Total Lecture Hours	**90**

Web Reference

1. https://www.oracle.com/tools/technologies/building-j2ee-web-applications.html
2. https://pdfslide.net/documents/j2ee-lab-manual.html

COURSE OUTCOMES		**K Level**
At the end of the Course the students will be able to		
CO1:	Ability to understand the Java	**K2**
CO2:	Understand the usage of Exception Handling	**K2**
CO3:	Ability to implement the concept of servlets, client and server based applications	**K2**
CO4:	Examine the use of Controls in Applet and GUI	**K3**
CO5:	Develop Servlets, JSP and Net Beans Applications	**K3**

CO & PO Mappings:

CO's/PO's	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	3	3	2	3
CO2	3	2	3	1	3	3
CO3	2	2	2	3	1	2
CO4	3	3	3	2	3	3
CO5	3	3	2	2	2	3

*3. Advanced Applications 2.Intermediate Development 1.Introductory Level

LESSON PLAN

S. No.	List of Programs	Hrs	Mode
1.	OOPS – Class, Objects.	90	Laboratory Experiments
2.	OOPS – Polymorphism, Encapsulation.		
3.	Inheritance and types.		
4.	Strings.		
5.	Exception Handling.		
6.	Threads.		
7.	Applets.		
8.	RMI - Invocation of server side methods		
9.	Servlets - Returning Information received from the client.		
10.	Client/Server Programming		
11	JSP - use of java beans.		
12	EJB – Session Bean.		
13	EJB – Entity Bean		

Course Designed by**: Mr.P.Ganeshbabu & Dr.S.BharaniSethupandian**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**INTRODUCTION TO INTERNET**			
Course Code	**21PCSNP1**	**L**	**P**	**C**
Category	**Non Major Elective**	-	6	6

Nature of Course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

Course Objectives:

- Introduces the basic features of Microsoft Office
- Develops familiarity with Word, Excel, PowerPoint, email, and Internet basics.
- Learn the definition of the Internet and World Wide Web
- Understand how to access the Internet and Web
- Perform Internet and Web-related tasks, including email, searching, and communicating accurately using real-world tools

S. No.	List of Programs	Hours
1.	.Create webpage with Colorful text and Background color using HTML tags.	
	Create Ordered list and Unordered List of data using HTML tags.	
2.	Create College Time Table using HTML. Also put Border around the table.	
3.	Create Internal and External Hyperlinks.	
4.	Implement the concept of Frames.	
5.	Create Login Form	
6.	Display image on the web browser with hyperlink	
7.	Design Bio data	
8.	Create webpage with different style sheet	
9.	Create webpage with all character elements in html	**90**
10.	.Create CSS program to display text with color	
11	Create CSS program Display text with Background color	
12	Create CSS program Display text with border	
13	Create CSS program Display with text box	
14	. Create CSS program Display image with text	
15	Create CSS program Display image with box	
16	Create Online Application Form	
17	Create Simple Website for on line shopping.	
18		
19		
20		
	Total Lab Hours	**90**

Web Reference

1. https://www.w3schools.com/html/html_editors.asp
2. https://www.w3schools.com/css/default.asp
3. https://www.w3schools.com/js/default.asp

COURSE OUTCOMES: **At the end of the Course the students will be able to**		**K Level**
CO1:	To compare the different packages of MS Office	**K2**
CO2:	To apply the format and design tools in the document	**K3**
CO3:	To simplify the data using MS –Excel	**K4**
CO4:	To evaluate application in online using Google forms	**K4**
CO5:	To interpret the MS- Office package and Google Tools	**K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	3	3	3
CO 2	2	2	3	3	3	2
CO 3	3	3	3	2	2	3
CO 4	3	3	2	3	2	2
CO5	3	2	3	3	3	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

S.No.	List of Programs	Hrs	Mode
1.	.Create webpage with Colorful text and Background color using HTML tags.	90	Lab Demonstration
2.	Create Ordered list and Unordered List of data using HTML tags.		
3.	Create College Time Table using HTML. Also put Border around the table.		
4.	Create Internal and External Hyperlinks.		
5.	Implement the concept of Frames.		
6.	Create Login Form		
7.	Display image on the web browser with hyperlink		
8.	Design Bio data		
9.	Create webpage with different style sheet		
10.	Create webpage with all character elements in html		
11	Create CSS program to display text with color		
12	Create CSS program Display text with Background color		
13	Create CSS program Display text with border		
14	Create CSS program Display with text box		
15	Create CSS program Display image with text		
16	Create CSS program Display image with box		
17	Create Online Application Form		
18	Create Simple Website for on line shopping.		
19			
20			

Course Designed by: **Mr. M. Rameshkumar & Mrs. T.C. Sujitha**


THIRD SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**MACHINE LEARNING**							
Course Code	**21PCSC31**					**L**	**P**	**C**
Category	**CORE**					6	-	4
Nature of course:	**EMPLOYABILITY**	✓	**SKILLORIENTED**	✓	ENTREPRENEURSHIP			

COURSE OBJECTIVES:

- Students will be able to know the basic concepts and techniques of Machine Learning
- Students will be able to understand the Supervised and Unsupervised learning techniques.
- Students will be able to study the various probability based learning techniques.
- Students will be able to understand the Supervised learning techniques and Neural Networks
- Students will be able to understand the Unsupervised learning techniques and Neural Networks

Unit: I	**Introduction**	18 Hours

Learning – Types of Machine Learning – Applications of Machine Learning – Tools in Machine Learning– Machine Learning Activities – Basic Types of Data in Machine Learning - Exploring Structure of Data – Data Quality and Remediation – Data Pre-Processing.

Unit: II	**Linear Models**	18 Hours

Selecting a Model – Training a Model – Model Representation and Interpretability – Evaluating Performance of a Model – Improving Performance of a Model – Feature Transformation – Feature Subset Selection.

Unit: III	**Overview of Probability**	18 Hours

Importance of Statistical Tools in Machine Learning – Concept of Probability – Frequent and Bayesian Interpretation – Random Variables – Some Common Discrete Distribution – Some Common Continuous Distribution – Multiple Random Variables – Central Limit Theorem – Sampling Distribution – Hypothesis Testing – Monte Carlo Approximation.

Unit: IV	**Supervised Learning**	18 Hours

Classification Model – Classification Learning Steps – Classification Algorithms – Simple and Multiple Linear Regression – Polynomial Regression Model – Logistic Regression – Maximum Likelihood Estimation

Unit: V	**Unsupervised Learning**	18 Hours

Introduction - Applications of Unsupervised Learning – Clustering – Finding pattern using Association Rule – Types of Activation Functions – Early Implementation of ANN – Architectures of Neural Network - Learning Process in ANN – Backpropagation – Deep Learning

	Total Lecture Hours	90 Hours

Books for Study:

2. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning", Pearson, 2019

Books for Reference:

3. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition,
4. Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
5. Tom M Mitchell, "Machine Learning", First Edition, McGraw Hill Education, 2013.Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.

6. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley, 2014
7. EthemAlpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", Third Edition, MIT Press, 2014.

Web Reference:

1. https://www.geeksforgeeks.org/machine-learning/
2. https://www.tutorialspoint.com/machine_learning/index.htm
3. https://hackr.io/blog/best-machine-learning-books
4. https://jonathan-hui.medium.com/machine-learning-graphical-model-b68b0c27a749

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Understand the basic concepts and techniques of Machine Learning.	**Upto,K3**
CO2	Apply different models on datasets and design suitable problem solutions.	**UptoK3**
CO3	Study the various probability based learning techniques	**UptoK3**
CO4	Apply specific supervised machine learning techniques for a particular problem	**UptoK4**
CO5	Understand the Supervised and Unsupervised learning techniques, design of Neural Networks.	**UptoK4**

CO & PO Mappings:

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	**1**	**3**	**3**	**3**	**3**	**2**
CO 2	**2**	**2**	**2**	**2**	**2**	**2**
CO 3	**2**	**3**	**2**	**2**	**1**	**2**
CO 4	**3**	**2**	**3**	**1**	**2**	**1**
CO 5	2	2	3	2	2	1

***3** –Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	MACHINE LEARNING	Hrs	Mode
I	Learning – Types of Machine Learning – Applications of Machine Learning – Tools in Machine Learning – Machine Learning Activities – Basic Types of Data in Machine Learning - Exploring Structure of Data – Data Quality and Remediation – Data Pre-Processing.	18	Chalk & Talk, PPT
II	Selecting a Model – Training a Model – Model Representation and Interpretability – Evaluating Performance of a Model – Improving Performance of a Model – Feature Transformation – Feature Subset Selection.	18	Chalk & Talk, PPT
III	Importance of Statistical Tools in Machine Learning – Concept of Probability – Frequent and Bayesian Interpretation – Random Variables – Some Common Discrete Distribution – Some Common Continuous Distribution – Multiple Random Variables – Central Limit Theorem – Sampling Distribution – Hypothesis Testing – Monte Carlo Approximation.	18	Chalk & Talk, PPT
IV	Classification Model – Classification Learning Steps – Classification Algorithms – Simple and Multiple Linear Regression – Polynomial Regression Model – Logistic Regression – Maximum Likelihood Estimation	18	Chalk & Talk, PPT
V	Introduction - Applications of Unsupervised Learning – Clustering – Finding pattern using Association Rule – Types of Activation Functions – Early Implementation of ANN – Architectures of Neural Network - Learning Process in ANN – Backpropagation – Deep Learning.	18	Chalk & Talk, PPT

Course Designed by: Dr.G.Devika & Dr.M.MuthuLakshmi

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	**5**		**-**	**-**	**5**	**4.17**	**17**
K2	**5**	**10**	**-**	**-**	**15**	**12.5**	
K3	**-**	**-**	**30**	**30**	**60**	**50**	**50**
K4	**-**	**-**	**20**	**20**	**40**	**33.33**	**33**
Marks	**10**	**10**	**50**	**50**	**120**	**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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**THEORY OF COMPUTATION**				
Course Code	**21PCSC32**			**L**	**P**	**C**
Category	**Core**			6	-	4
Nature of course	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP		

COURSE OBJECTIVES:

- To give an overview of the theoretical foundations of computer science from the perspective of formal languages.
- To illustrate finite state machines to solve problems in computing.
- To explain the hierarchy of problems arising in the computer sciences.
- To familiarize Regular grammars, context free grammar.
- To understand Turing machines and their capability.

Unit: I	**Finite Automata (FA)**	18 Hrs

Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.

Unit: II	**Regular Expressions And Grammars**	18 Hrs

Regular Expressions (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. **Regular Grammars:** Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.

Unit: III	**Context Free Grammar**	18 Hrs

Context Free Grammar (CFG): Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted).

Unit: IV	**Pushdown Automata and Turing Machines**	18 Hrs

Pushdown Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.

Turing Machines (TM): Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of TMs.

Unit: V	**Recursive And Recursively Enumerable Language**	18 Hrs

Recursive And Recursively Enumerable Languages (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

Total Lecture Hours	**90**

Book for Study:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2008), Introduction to Automata Theory Languages and Computation, 3rd edition, Pearson Education, India.

Books for Reference:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2ndedition, Prentice Hall of India,India.

Web Reference:

1. **https://www.w3schools.com/**
2. **https://www.tutorialspoint.com/automata_theory/**
3. **https://nptel.ac.in/courses/106/104/106104028/**

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Use basic concepts of formal languages of finite automata techniques	**Upto K3**
CO2	Design Finite Automata's for different Regular Expressions and Languages	**Upto K3**
CO3	Construct context free grammar for various languages	**Upto K3**
CO4	Solve various problems of applying normal form techniques, push down automata and Turing Machines	**Upto**K4
CO5	Create various algorithms in due with techniques.	**Upto K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	3	2	3
CO 2	2	3	2	3	3	2
CO 3	3	1	3	3	2	3
CO 4	2	2	1	3	3	2
CO5	3	3	3	3	2	3

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	THEORY OF COMPUTATION	Hrs	Mode
I	**Finite Automata (FA):** Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.	18	Chalk &Talk, PPT
II	**Regular Expressions (RE)**: Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular expressions. **Regular Grammars:** Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.	18	Chalk &Talk, PPT
III	**Context Free Grammer (CFG):** Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted).	18	Chalk &Talk, PPT
IV	**Pushdown Automata:** Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stackand its Equivalence, Equivalence of CFG and PDA. **Turing Machines (TM)**: Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of TMs.	18	Chalk &Talk, PPT
V	**Recursive And Recursively Enumerable Languages (REL):** Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.	18	Chalk &Talk, PPT

Course Designed by: Dr.S.ShaikParveen & Mrs.M.MuthuLaksmi

Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**MACHINE LEARNING USING PYTHON LAB**			
Course Code	**21PCSCP4**	**L**	**P**	**C**
Category	**Core**	-	6	4

Nature of Course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

Course Objectives:

- Students will be able to understand the implementation procedures for the machine learning algorithms.
- Students will be able to design Python programs for various Machine Learning algorithms.
- Students will be able to apply appropriate data sets to the Machine Learning algorithms.
- Students will be able to identify and apply Machine Learning algorithms to solve real world problems.
- Students will be able to develop the ability to write database applications in Python.

S. No.	**List of Programs**	**Hours**
	Apply probability concepts for a dataset.	**90**
1.	Implement and demonstrate the most specific hypothesis based on a	
2.	given set of training data samples. Read the training data from a .CSV file.	
	Implement Decision Tree to classify the English text	
3.	Implement Regression algorithm with appropriate dataset.	
4.	Apply SVM algorithm to cluster a set of data stored in a .CSV file.	
5.	Implement K-Nearest neighbors classification using appropriate	
6.	dataset.	
7.	Assuming a set of documents that need to be classified, use the Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set	
8.	To construct a model considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.	
	Implement clustering techniques with a Data Set	
9.		
10.	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.	
	Total Hours	**90**

Books for Reference:

1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley, 2014
3. EthemAlpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", Third Edition, MIT Press, 2014.

Web Reference:

1. https://www.tutorialspoint.com/machine_learning_with_python/machine_learning_with_python_tutorial.pdf
2. https://archive.ics.uci.edu/ml/datasets.html
3. https://usermanual.wiki/Document/RNSIT20MACHINE20LEARNING20LAB20MANUAL202018201.354079817/help

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Understand best technologies for solving classification problems	**UptoK2**
CO2	Make use of Data sets in implementing the machine learning algorithms	**Upto K3**
CO3	Apply different models on datasets and design suitable problem solutions	**Upto K3**
CO4	Study the various probability based learning techniques	**Upto K4**
CO5	Understand neural network algorithms	**Upto K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	1	2	3	2
CO 2	3	2	2	3	3	2
CO 3	3	1	2	2	3	1
CO 4	2	2	2	2	1	2
CO 5	3	3	3	3	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –**Introductory Level

LESSON PLAN

S. No.	Machine Learning Using Python Lab	Hrs	Mode
1.	Apply probability concepts for a dataset.	90	Lab Demonstration
2.	Implement and demonstrate the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.		
3.	Implement Decision Tree to classify the English text		
4.	Implement Regression algorithm with appropriate dataset.		
5.	Apply SVM algorithm to cluster a set of data stored in a .CSV file.		
6.	Implement K-Nearest neighbors classification using appropriate dataset.		
7.	Assuming a set of documents that need to be classified, use the Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set		
8.	To construct a model considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.		
9.	Implement clustering techniques with a Data Set		
10.	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets		

Course Designed by: Dr.G.Devika & Mr.M.Rameshkumar

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**ADVANCED DATA STRUCTURES**			
Course Code	**21PCSE31**	**L**	**P**	**C**
Category	**ELECTIVE**	6	-	6

Nature of Course	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To understand the concept of Datastructuresand arrays.
- To understand basic data structures such as linked lists, stacks and queues.
- To describe the hash function and concepts of collision and its resolution methods
- To Solve problem involving graphs, trees and heaps
- To apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

Unit: I	**Introduction and Overview**	18 Hours

Definition – Concept of Data Structures – Overview of Data Structures– Implementation of Data Structures. Arrays: Definition – Terminology – One dimensional array – Multidimensional arrays.

Unit: II	**Linked List**	18 Hours

Definition – Single linked list – Circular Linked list – Double Linked lists – Circular Double Linked List – Applications of Linked Lists.

Unit: III	**Applications of Stacks& Queues**	18 Hours

Applications of Stacks: Evaluation of Arithmetic Expressions-Code Generation for Stack Machines – Implementation of Recursion-Factorial Calculation – Quick Sort. Queues: Introduction – Definition – Representation of Queues – Various Queue Structures – Application of Queues.

Unit: IV	**Tables & Graph**	18 Hours

Tables: Rectangular Tables- Jagged Tables- Inverted Tables – Hash Tables. Trees: Basic Terminologies – Definition and Concepts – Representation of Binary Tree – Operations on aBinary Tree – Types of Binary Trees - Trees and Forests - B Trees - B+ Tree Indexing-. Graph: Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs -Application of Graph Structure.

Unit: V	**Sets**	18 Hours

Definition and Terminologies – Representation of Sets – Operations of Sets – Applications of Sets. Sorting: Basic Terminologies – Sorting Techniques.

Total Lecture Hours	90

Books for Study:

1.DebasisSamanta, Classic Data Structures, 2nd Edition, PHI, New Delhi, 2013.

Unit I : Chapter 1 (Full) Chapter 2 (Full)
Unit II: Chapter 3(Full)
Unit III :Chapter 4 (Full)
Chapter 5 (Full)
Unit IV:Chapter 6 (Full) Chapter 7; Section – 7.1 to 7.8
Chapter 8; Section – 8.1 to 8.5
Unit V: Chapter 9 (Full)
Chapter 10 (Full)

Books for Reference:

1. .Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, New Delhi, 2007.

2. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structure using C and C++, Second Edition, PHI, New Delhi, 2006.
3. A.A.Puntambekar, Advanced Data Structures and Algorithms, 1st Edition, Technical Publications, Pune, 2008.

Web Reference:

1. https://www.geeksforgeeks.org/overview-of-data-structures-set-1-linear-data-structures/
2. https://www.tutorialspoint.com/data_structures_algorithms/dsa_quick_guide.htm
3. https://docs.oracle.com/cd/E19199-01/817-1835-10/npgstruct.html

Course Outcome		K Level
CO1	To study various data structure concepts like Stacks, Queues, Linked List, Trees and Graphs.	Upto K3
CO2	To be familiar with utilization of data structure techniques in problem solving.	Upto K3
CO3	To have a comprehensive knowledge of data structures.	Upto K3
CO4	To provide the skill in advanced data structures.	Upto K4
CO5	To introduce various techniques for representation of the data in the real world.	Upto K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	2
CO 2	2	2	2	2	3	3
CO 3	3	1	2	2	2	2
CO 4	2	2	2	2	1	2
CO 5	3	3	2	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	ADVANCED DATA STRUCTURES	Hrs	Mode
I	**Introduction and Overview:** Definition – Concept of Data Structures – Overview of Data Structures– Implementation of Data Structures. Arrays: Definition – Terminology – One dimensional array – Multidimensional arrays.	18	Chalk & Talk
II	**Linked List:** Definition – Single linked list – Circular Linked list – Double Linked lists – Circular Double Linked List – Applications of Linked Lists.	18	Chalk & Talk
III	**Applications of Stacks& Queues:** Evaluation of Arithmetic Expressions-Code Generation for Stack Machines –Implementation of Recursion-Factorial Calculation – Quick Sort. Queues: Introduction – Definition – Representation of Queues – Various Queue Structures – Application of Queues.	18	Chalk & Talk
IV	**Tables & Graph:** Rectangular Tables- Jagged Tables- Inverted Tables – Hash Tables. Trees: Basic Terminologies – Definition and Concepts – Representation of Binary Tree – Operations on a Binary Tree – Types of Binary Trees - Trees and Forests - B Trees - B+ Tree Indexing-. Graph: Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs - Application of Graph Structure.	18	Chalk & Talk
V	**Sets & Sorting:** Definition and Terminologies – Representation of Sets – Operations of Sets – Applications of Sets. Sorting: Basic Terminologies – Sorting Techniques.	18	ICT

Course Designed by Dr.R.Bagavathi Lakshmi & Dr.S.ShaikParveen

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**SOFTWARE ENGINEERING**			
Course Code	**21PCSE32**	**L**	**P**	**C**
Category	**ELECTIVE**	6	-	6

Nature of course:	**EMPLOYABILITY**	✓	SKILLORIENTED	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To provide the idea of decomposing the given problem into Analysis, Designing, Implementation, Testing and Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
- To acquire skills and knowledge to support a professional pathway, including analytic, and technical skills
- To gain knowledge about the methodologies behind the software engineering and testing

Unit: I	**Introduction:**	18 Hours

Definition of software and software engineering – Software myths – Software Engineering paradigms: Linear Sequential Model & Prototyping Model- Software Project Management – Software Metrics – Software Cost Estimation – Software

Unit: II	**Software Requirement Analysis:**	18 Hours

Software Risks – Software Configuration Management- System Analysis – Modeling the System Architecture – System Specification – Fundamentals of Requirement Analysis – Software Prototyping – Prototyping method sand tools specification – Software requirements Specifications

Unit: III	**Structured Analysis:**	18 Hours

Introduction – the elements of the analysis model – data objects, attributes and relationships – Cardinality and Modality – ERD – DFD – Classical Analysis Methods : DSSD, JSD, SADT.

Unit: IV	**Software Design:**	18 Hours

Software Design and Software Engineering – Design and Software Quality – Evolution of Software Design – Design Principles. Design Concepts,Abstraction, Refinement, Modularity – Effective Modular Design, Functional - Independence, Cohesion, Coupling.

Unit: V	**Software Testing Methods:**	18 Hours

Software Testing Fundamentals – White Box Testing – Black Box Testing – Debugging – Software Quality: McCall's Quality Factors

Total Lecture Hours	90 Hours

Books for Study:

1. Roger S. Pressman "Software Engineering – A Practioner's Approach"McGraw Hill , 4th Edition

Books for Reference:

1. Software Engineering – Design Reliability and Management" by Richard Fairley
2. Software Engineering " by Sommerville, Pearson Education, 7th Edition
3. Software Engineering, Ian Sommerville, seventh edition, Pearson education.
4. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010

Web Reference:
1. https://www.tutorialspoint.com/software_engineering.htm
2. https://www.javatpoint.com/software-engineering

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Decompose the given project in various phases of a lifecycle.	**UptoK3**
CO2	Choose appropriate process model depending on the user requirements	**UptoK3**
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	**Upto K3**
CO4	Know various processes used in all the phases of the product	**Upto K4**
CO5	Apply the knowledge, techniques, and skills in the development of a software product	**Upto K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	**3**	**3**	**2**	**2**	**3**	**2**
CO 2	**2**	**2**	**3**	**3**	**3**	**2**
CO 3	**3**	**2**	**3**	**2**	**2**	**3**
CO 4	**2**	**2**	**3**	**2**	**2**	**2**
CO 5	**3**	**3**	**2**	**3**	**3**	**3**

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –**Introductory Level

LESSON PLAN

UNIT	Software Engineering	Hrs	Mode
I	Definition of software and software engineering – Software myths – Software Engineering paradigms: Linear Sequential Model & Prototyping Model. Software Project Management – Software Metrics – Software Cost Estimation – Software	**18**	**Chalk & Talk, PPT**
II	Fundamentals of Requirement Analysis – Software Prototyping – Prototyping method sand tools specification – Software requirements Specifications.	**18**	**Chalk & Talk, PPT**
III	Structured Analysis: Introduction – the elements of the analysis model – data objects, attributes and relationships – Cardinality and Modality – ERD – DFD – Classical analysis Methods : DSSD, JSD, SADT	**18**	**Chalk &Talk, PPT**
IV	Software Design and Software Engineering **–** Design and Software Quality – Evolution of Software Design – Design Principles. Design Concepts, Abstraction, Refinement, Modularity – Effective Modular Design, Functional Independence, Cohesion, Coupling	**18**	**Chalk & Talk, PPT**
V	Software Testing Fundamentals – White Box Testing – BlackBox Testing – Debugging – Software Quality: McCall's Quality Factors.	**18**	**Chalk & Talk, PPT**

Course Designed by:Mr.M.Ramesh Kumar&Mrs.T.Sujithra

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AI	**CO2**	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AII	**CO4**	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**SOFT COMPUTING**			
Course Code	**21PCSE33**	**L**	**P**	**C**
Category	**Elective**	6	-	6
Nature of Course	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To have knowledge about the basic working of a areas of Soft Computing including Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To understand Soft Computing concepts, technologies, and applications
- To understand the underlying principle of soft computing with its usage in various application. .
- To understand different soft computing tools to solve real life problems.

Unit: I	**Introduction**	18 Hours

Introduction: Hard Computing - Soft Computing - Hybrid Computing. Introduction to Genetic Algorithms: Working Cycle of a Genetic Algorithms - Binary-Coded GA – GA - parameters Setting-Constraints Handling in GA - Advantages and Disadvantages of Genetic Algorithms - Combination of local and Global Optimum Search Algorithms.

Unit: II	**Introduction to Fuzzy Sets**	18 Hours

Introduction to Fuzzy Sets:Crisp Sets-Measures of Fuzziness and Inaccuracy of Fuzzy sets Fuzzy Reasoning and Clustering:Introduction-Fuzzy Logic Controller-Fuzzy Clustering.

Unit: III	**Fundamentals of Neural Networks**	18 Hours

Fundamentals of Neural Networks: Introduction-Static vs. Dynamic Neural NetworksTraining of Neural Network. Some Examples of Neural Networks: Introduction - Multilayer Feed-Forward Neural Network(MLFFNN)-Radial Basis Function Network (RBFN) - Self Organizing Map(SOM) - Counter – Propagation Neural Network(CPNN) - Recurrent Neural Network(RNNs).

Unit: IV	**Genetic Algorithms**	18 Hours

Genetic Algorithms: Fuzzy Logic-Introduction-Fuzzy -Genetic Algorithm-Genetic-Fuzzy System.GeneticAlgorithms:Neural Networks-Introduction-Working Principle of a GeneticNeural System.

Unit: V	**Neural Networks**	18 Hours

Neural Networks:Fuzzy Logic-Introduction – Neuro-Fuzzy System Working based on Mamdani Approach-Neuro Fuzzy System based on Takagi and Sugeno‟sApproach.Application of Soft Computing:Introduction-Application of Soft Computing in Design and Development of Intelligent-Application of Soft Computing in Data Analysis.

Total Lecture Hours	90

Book for Study:

1. DilipK.Pratihar, “SoftComputing, Fundamenatals and Applications”, Narosa Publishing House, 2014, New Delhi.

Unit I- Chapter1(Full), Chapter3(Full).
Unit II-Chapter7(Full),Chapter8(Full).
Unit III- Chapter9(Full),Chapter10(Full).
Unit IV-Chapter11(Full),Chapter12(Full).

Unit V-Chapter13(Full),Chater14(Full).	
Books for Reference:	
1.Rajasekaran. S and Pai. G.A.V, NeuralNetworks, Fuzzy Logic and Genetic Algorithms, PHI, 2003 2. Jang.J.S.R, Sun. C.T and Mizutani, Neuro Fuzzy and Soft Computing, Pearson Education, 2004 3. Deepa. S. N and Sivanandam.S. N, Principles of Soft Computing, Wiley publication, 2nd Edition	
Web Reference:	
1. http://www.vssut.ac.in/lecture_notes/lecture1423723637.pdf **2. https://nptel.ac.in/courses/106105173/** **3. http://www.myreaders.info/01_Introduction_to_Soft_Computing.pdf**	
Course Outcome:	**K Level**
CO1: Learn about soft computing techniques and their applications	**Upto K3**
CO2: Know about the fuzzy logic concepts	**Upto K3**
CO3: Understand perceptrons and counter propagation networks..	**Upto K3**
CO4: Evaluate the genetic algorithms and their applications	**Upto K4**
CO5: Analyze various neural network architectures	**Upto K4**

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	2
CO 2	2	2	3	3	3	2
CO 3	3	2	3	2	2	3
CO 4	2	2	3	2	2	2
CO 5	3	3	2	3	3	3

***3** –Advanced Application; **2** – Intermediate Development; **1** –Introductory Level

LESSON PLAN

UNIT	SOFT COMPUTING	Hrs	Mode
I	**Introduction:** Hard Computing - Soft Computing - Hybrid Computing. Introduction to Genetic Algorithms: Working Cycle of a Genetic Algorithms - Binary-Coded GA – GA - parameters Setting-Constraints Handling in GA - Advantages and Disadvantages of Genetic Algorithms - Combination of local and Global Optimum Search Algorithms.	18	Chalk & Talk
II	**Introduction to Fuzzy Sets**:Crisp Sets-Measures of Fuzziness and Inaccuracy of Fuzzy sets Fuzzy Reasoning and Clustering:Introduction-Fuzzy Logic Controller-Fuzzy Clustering.	18	Chalk & Talk
III	**Fundamentals of Neural Networks**: Introduction-Static vs. Dynamic Neural NetworksTraining of Neural Network. Some Examples of Neural Networks: Introduction - Multilayer Feed-Forward Neural Network(MLFFNN)-Radial Basis Function Network (RBFN) - Self Organizing Map(SOM) - Counter – Propagation Neural Network(CPNN) - Recurrent Neural Network(RNNs).	18	Chalk & Talk
IV	**Genetic Algorithms**: Fuzzy Logic-Introduction-Fuzzy -Genetic Algorithm-Genetic-Fuzzy System.GeneticAlgorithms:Neural Networks-Introduction-Working Principle of a GeneticNeural System.	18	Chalk & Talk
V	**Neural Networks**:Fuzzy Logic-Introduction – Neuro-Fuzzy System Working based on Mamdani Approach-Neuro Fuzzy System based on Takagi and Sugeno‟sApproach.Application of Soft Computing:Introduction-Application of Soft Computing in Design and Development of Intelligent-Application of Soft Computing in Data Analysis.	18	ICT

Course Designed by: Mrs.K.Sandya&Mr.M.Rameshkumar

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**DATABASE MANAGEMENT SYSTEM**			
Course Code	**21PCSE34**	**L**	**P**	**C**
Category	**Elective**	6	-	6
Nature of Course	EMPLOYABILITY	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To know the basic concepts of database systems.
- To understand the basics of SQL and construct queries using SQL.
- To understand the file organization concepts.
- To understand the relational database storage systems.
- To familiar with the basic issues of transaction processing and concurrency control and normal forms.

Unit: I	**Overview of Database Systems:**	18 Hours

Managing Data – A Historical Perspective – Purpose of database systems- Data base Architecture-– Advantages of a DBMS – File Systems versus DBMS– Transaction Management Introduction to Database Design: Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of the ER Model – Conceptual Design with the ER Model - Conceptual design for large Enterprises – The Unified Modeling Language..

Unit: II	**The Relational Model:**	18 Hours

Introduction to the Relational Model – Integrity Constraints– Querying Relational Data - Logical Database Design: ER to Relational – Introduction to Views – Destroying /Altering Tables and Views. Relational Algebra and Calculus: Relational Algebra – Relational Calculus – Expressive Power of Algebra and Calculus. SQL: Queries, Constraints, Triggers: The Forms of a Basic SQL Query – UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL- Triggers and Active Databases.

Unit: III	**Overview of Storage and Indexing:**	18 Hours

Data on External Storage – File Organizations and Indexing – Index Data structures – Comparison of File Organizations – Indexes and Performance Tuning. Storing Data: Disks and Files: The Memory Hierarchy – Redundant Arrays of Independent Disk – Disk Space Management – Buffer Manager – Files of Records – Page Formats – Record Formats

Unit: IV	**Overview of Transaction Management:**	18 Hours

The ACID Properties – Transactions and Schedules – Concurrent Execution of Transactions – Lock-Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery. Crash Recovery: Introduction to ARIES – The log – Other Recovery-Related Structures – The Write-Ahead Log Protocol – Check pointing - Recovering from a System Crash – Media Recovery – Serializability and concurrency Control

Unit: V	**Schema Refinement and Normal Forms:**	18 Hours

Introduction to Schema Refinement–Functional Dependencies–Normal Forms–Propertiesof Decompositions-Normalization – Schema Refinement in Database Design - Other kinds of Dependencies. Physical Database Design and Tuning: Introduction to Physical Database Design – Guidelines for IndexSelection – Basic Examples of Index Selection – Clustering and Indexing – Indexes that Enable ofIndex selection – Tools to Assist in Index Selection - Overview of Database Tuning – Choices inTuningthe Conceptual Schema–Choicesin Tuning Queries and Views–Impact of Concurrency.

Total Lecture Hours	**90**

Books for Study:

1. Raghu Ramakrishnan and Johnannes Gehrke, **Database Management Systems**,3rd Edition, Tata McGraw-Hill, New Delhi, 2014.
Unit I : Chapter 1 Section 1.1 to 1.9
Chapter 2 Section 2.1 to 2.7
Unit II : Chapter 3 Section 3.1 to 3.7
Chapter 4 Section 4.1 to 4.4
Chapter 5 Section 5.2 to 5.8
Unit III: Chapter 8 Section 8.1 to 8.5
Chapter 9 Section 9.1 to 9.7
Unit IV: Chapter16Section 16.1 to 16.7
Chapter18 Section 18.1 to 18.8
Unit V: Chapter 19 Section 19.1to 19.8
Chapter 20 Section 20.1 to 20.10

Books for Reference:

1. Silberschatz, Henry F.Korth, S.Sudarshan, **Database System Concepts**, 3rd Edition, Tata McGraw-Hill, New Delhi, 1997.
2. C. J. Date, **An Introduction to Database Systems**, 8th Edition, Pearson Education, New Delhi, 2007.
3. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 7th Edition, Pearson India, New Delhi, 2016.

Web Reference:

https://www.db-book.com/slides-dir/index.html
https://mrcet.com/downloads/digital_notes/ECE/III%20Year/DATABASE%20MANAGEMENT%20SYSTEMS.pdf
https://www.tutorialspoint.com/dbms/index.htm
https://www.geeksforgeeks.org/dbms/

Course Outcome		**K Level**
CO1	Explain the structure and model of the relational database system..	**Upto K3**
CO2	Make a study of SQL and Relational database design.	**Upto K3**
CO3	Analyze different information about the organization requiring an database and translate them to user requirements. Interpret knowledge in transaction processing with relational database design.	**UptoK3**
CO4	Analyze different information about the organization requiring an database and translate them to user requirements.	**UptoK4**
CO5	Create and populate a RDBMS for a real life application, with constraints, keys using SQL.	**Upto K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	2
CO 2	2	2	2	2	3	3
CO 3	3	1	2	2	2	2
CO 4	2	2	2	2	1	2
CO 5	3	3	2	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	DATABASE MANAGEMENT SYSTEM	Hrs	Mode
I	Managing Data – A Historical Perspective – Purpose of database systems- Data base Architecture-– Advantages of a DBMS – File Systems versus DBMS– Transaction Management - Introduction to Database Design: Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of the ER Model – Conceptual Design with the ER Model - Conceptual design for large Enterprises – The Unified Modeling Language**.**	18	Chalk & Talk
II	Introduction to the Relational Model – Integrity Constraints– Querying Relational Data - Logical Database Design: ER to Relational – Introduction to Views – Destroying /Altering Tables and Views. Relational Algebra and Calculus: Relational Algebra – Relational Calculus – Expressive Power of Algebra and Calculus. SQL: Queries, Constraints, Triggers: The Forms of a Basic SQL Query – UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL- Triggers and Active Databases.	18	Chalk & Talk
III	Data on External Storage – File Organizations and Indexing – Index Data structures – Comparison of File Organizations – Indexes and Performance Tuning. Storing Data: Disks and Files: The Memory Hierarchy – Redundant Arrays of Independent Disk – Disk Space Management – Buffer Manager – Files of Records – Page Formats – Record Formats.	18	Chalk & Talk
IV	The ACID Properties – Transactions and Schedules – Concurrent Execution of Transactions – Lock-Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery. Crash Recovery: Introduction to ARIES – The log – Other Recovery-Related Structures – The Write-Ahead Log Protocol – Check pointing - Recovering from a System Crash – Media Recovery – Serializability and concurrency Control	18	Chalk & Talk
V	Introduction to Schema Refinement – Functional Dependencies–Normal Forms – Properties of Decompositions - Normalization – Schema Refinement in Database Design - Other kinds of Dependencies. Physical Database Design and Tuning: Introduction to Physical Database Design – Guidelines for Index Selection – Basic Examples of Index Selection – Clustering and Indexing – Indexes that Enable of Index selection – Tools to Assist in Index Selection - Overview of Database Tuning – Choices in Tuning the Conceptual Schema – Choices in Tuning Queries and Views – Impact of Concurrency.	18	ICT

Course Designed by:Mrs.K.Sandya & Dr.S.Shaik Parveen

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**DATA WAREHOUSING AND DATA MINING**				
Course Code	**21PCSE35**		**L**	**P**	**C**
Category	**ELECTIVE**		6	-	6
Nature of Course	EMPLOYABILITY	**SKILLORIENTED** ✓	ENTREPRENEURSHIP		

COURSE OBJECTIVES:

- Differentiate Online Transaction Processing and Online Analytical processing
- Learn Multidimensional schemas suitable for data warehousing
- Understand various data mining functionalities
- Inculcate knowledge on data mining query languages.
- Know in detail about data mining algorithms

Unit: I	**Data Warehouse**	18 Hours

Data Warehouse: Introduction to Data Ware House, Differences between operational data base systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction-Transformation-Loading, Logical (Mulit- Dimensional), Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact- Less-Facts, Dimension Table characteristics; Fact-Less-Facts, Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

Unit: II	**Introduction to Data Mining**	18 Hours

Introduction to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks,Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation , Data Transformation; Measures of similarity and dissimilarity-Basics.

Unit: III	**Association Rules**	18 Hours

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

Unit: IV	**Classification**	18 Hours

Classification: Problem definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision trees-Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest neighbor classification-Algorithm and characteristics.

Unit: V	**Clustering**	18 Hours

Clustering: Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection.

Total Lecture Hours	90

Books for Study:

1. Data Mining-Concepts and Techniques- Jiawei Han, MichelineKamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-NingTan, VipinKumar, Michael Steinbanch, Pearson Education.

Books for Reference:

1. Data Mining Techniques, Arun K Pujari, 3rdEdition, UniversitiesPress.
2. Data Ware Housing Fundamentals, PualrajPonnaiah, Wiley StudentEdition.
3. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley StudentEdition.
4. Data Mining, VikaramPudi, P Radha Krishna, OxfordUniversity.

Web Reference:

1. **https://www.w3schools.com/**
2. **https://www.javatpoint.com/data-warehouse**
3. **https://nptel.ac.in/courses/106/105/106105174/**

Course Outcome		**K Level**
CO1	Understand the functionality of the various data mining and data warehousing component	**Upto K3**
CO2	Appreciatethe strengths and limitations of various data mining and data warehousing models	**Upto K3**
CO3	Explainthe analyzing techniques of various data	**Upto K3**
CO4	Describedifferent methodologies used in data mining and data ware housing.	**Upto K4**
CO5	Compare different approaches of data ware housing and data mining with various technologies.	**Upto K4**

CO & PO Mappings:

COS	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	3	2	2	2	3	2
CO 2	2	2	2	2	3	3
CO 3	3	1	2	2	2	2
CO 4	2	2	2	2	1	2
CO 5	3	3	2	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	DATA WAREHOUSING AND DATA MINING	Hrs	Mode
I	**Data Warehouse:** Introduction to Data Ware House, Differences between operational data base systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction-Transformation-Loading, Logical (Mulit- Dimensional), Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact- Less-Facts, Dimension Table characteristics; Fact-Less-Facts, Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP	18	Chalk& Talk, Presentation
II	**Introduction to Data Mining:** Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks,Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation , Data Transformation; Measures of similarity and dissimilarity-Basics.	18	Chalk& Talk,Presentation
III	**Association Rules:** Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.	18	Chalk& Talk,Presentation
IV	**Classification:** Problem definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision trees-Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest neighbor classification-Algorithm and characteristics.	18	Chalk& Talk,Presentation
V	**Clustering:** Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection.	18	Chalk& Talk,Presentation

Course Designed by: Mrs.K.Sandya & Dr.M.Karthika

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) **Answer All Questions**			**(10x1=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**CYBER SECURITY**			
Course Code	**21PCSE36**	**L**	**P**	**C**
Category	**ELECTIVE**	6	-	6
Nature of Course:	**EMPLOYABILITY** ✓	SKILLORIENTED	ENTREPRENEURSHIP	

COURSE OBJECTIVES:

- Provide knowledge for protecting damaged systems, protecting personal data and securing computer networks in an organization.
- Practice using academic knowledge to design and implement security solutions.
- Understand key cryptography, governance, and compliance terms and concepts.
- Development of cyber security strategies and guidelines.
- Understand the principles of web security and keep the network secure by monitoring and analyzing the nature of attacks using cyber / computer forensics software / tools.

Unit: I	**Cyber Security Fundamentals**	18 Hours

Cyber Security Fundamentals: Network and Security Concept- Information Assurance Fundamentals –Basic Cryptography - Symmetric Encryption - Public Key Encryption -The Domain Name System (DNS) - Firewalls -Microsoft Windows Security Principles - Windows Tokens - Window Messaging - Windows Program Execution - The Windows Firewall

Unit: II	**Attacker Techniques and Motivations**	18 Hours

Attacker Techniques and Motivations: How Hackers Cover Their Tracks (Antiforensics) - Tunneling Techniques - Fraud Techniques - Phishing, Smishing, Vishing, and Mobile Malicious Code - Rogue Antivirus - Click - Threat Infrastructure

Unit: III	**Exploitation**	18 Hours

Exploitation: Format String Vulnerabilities - SQL Injection –Protecting against SQL injection-Malicious PDF Files- PDF File format-Creating malicious PDF Files-Reducing the risk of Malicious PDF file- Race Conditions

Unit: IV	**Malicious Code**	18 Hours

Malicious Code: Self-Replicating Malicious Code - Rootkits -Spyware -Token Kidnapping - Stealing Information and Exploitation - Form Grabbing - Man-in-the-Middle Attacks - DLL Injection - Browser Helper Objects

Unit: V	**Defense and Analysis Techniques**	18 Hours

Defense and Analysis Techniques: Memory Forensics - Why Memory Forensics Is Important - Capabilities of Memory Forensics - Memory Analysis Frameworks - Dumping Physical Memory - Installing and Using Volatility - Finding Hidden Processes - Volatility Analyst Pack - Honeypots

Total Lecture Hours	90

Books for Study:

1. James Graham, Richard Howard and Ryan Olson "**CYBER SECURITY ESSENTIALS**" CRC Press, Auerbach , Publications, First Edition, 2011

Unit I : Chapter :1 - Section : 1.1.1-1.1.6,1.2.1-1.2.4
Unit II : Chapter: 2 - Section : 2.1.1-2.3.3
Unit III : Chapter: 3 - Section : 3.1.4-3.1.7
Unit IV : Chapter: 4 - Section : 4.1, 4.2.4,4.2.5,4.2.7,4.3
Unit V : Chapter: 5 - Section :5.1,5.2

Books for Reference:		
1. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015. 2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015		
Web Reference:		
1. https://onlinecourses.swayam2.ac.in/ugc19_hs25/preview **2. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview** **3. https://www.javatpoint.com/cyber-security-tutorial**		
Course Outcome		**K Level**
CO1:	To describe the fundamentals of cyber security	**Upto K3**
CO2:	To classify various network attacks, describe their sources, and mechanisms of prevention.	**Upto K3**
CO3:	To determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.	**Upto K3**
CO4:	To measure the performance and troubleshoot cyber security systems.	**Upto K4**
CO5:	To design the cyber security needs of an organization	**Upto K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	2
CO 2	2	2	2	2	3	3
CO 3	3	1	2	2	2	2
CO 4	2	2	2	2	1	2
CO 5	3	3	2	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –** Introductory Level

LESSON PLAN

UNIT	CYBER SECURITY	Hrs	Mode
I	**Cyber Security Fundamentals:**Network and Security Concept-Information Assurance Fundamentals –Basic Cryptography - Symmetric Encryption - Public Key Encryption -The Domain Name System (DNS) - Firewalls -Microsoft Windows Security Principles - Windows Tokens - Window Messaging - Windows Program Execution - The Windows Firewall	18	ICT
II	**Attacker Techniques and Motivations**: How Hackers Cover Their Tracks (Antiforensics) - Tunneling Techniques - Fraud Techniques - Phishing, Smishing, Vishing, and Mobile Malicious Code - Rogue Antivirus - Click - Threat Infrastructure	18	ICT
III	**Exploitation**: Format String Vulnerabilities - SQL Injection –Protecting against SQL injection- Malicious PDF Files- PDF File format-Creating malicious PDF Files-Reducing the risk of Malicious PDF file- Race Conditions	18	ICT
IV	**Malicious Code:** Self-Replicating Malicious Code - Rootkits -Spyware - Token Kidnapping - Stealing Information and Exploitation - Form Grabbing - Man-in-the-Middle Attacks - DLL Injection - Browser Helper Objects	18	ICT
V	**Defense and Analysis Techniques**: Memory Forensics - Why Memory Forensics Is Important - Capabilities of Memory Forensics - Memory Analysis Frameworks - Dumping Physical Memory - Installing and Using Volatility - Finding Hidden Processes - Volatility Analyst Pack – Honeypots	18	ICT

Course Designed by:Mrs.T.Sujithra&Mrs.M.Muthulakshmi

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	


FOURTH SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**BIG DATA ANALYTICS**			
Course Code	**21PCSC41**	**L**	**P**	**C**
Category	**CORE**	6	-	4

Nature of course:	**EMPLOYABILITY**	✓ **SKILLORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.
- To teach the Big Data Platform and its Use cases.

Unit: I	**Introduction to Big Data**	18 Hours

Types of Digital Data: Classification of Digital Data**.:** Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges in Big Data – Big Data definition – Other characteristics of Data – Need of Big Data – Traditional Business Intelligence (BI) vs Big Data – A typical Data Warehouse environment – A typical Hadoop environment – New things - Changes - Realms of Big Data.

Unit: II	**Big Data Analytics**	18 Hours

Big Data Analytics – Classification of Analytics – Greatest challenges thatprevent business from capitalizing on Big Data – Top challenges facing Big Data – Importance ofBig Data Analytics – Data Science – Data Scientist – Terminologies used in Big DataEnvironment – BASE – Analytics tool.

Unit: III	**The Big Data Technology Landscape**	18 Hours

NoSQL – Types of NoSQL Database – Need of NoSQL? – Advantages of NoSQL – Use of NoSQL in Industry – SQL vsNoSQL – Comparison of SQL, NoSQL and NewSQL.

Hadoop: Features of Hadoop – Advantages of Hadoop – Overview of Hadoop – Hadoop distribution – Hadoopvs SQL – Integrated Hadoop System – Cloud-Based Hadoop Solutions.

Unit: IV	**Introduction to Hadoop**	18 Hours

Introducing Hadoop – Need of Hadoop – Need of RDBMS – RDBMS vsHadoop – Distributed computing challenges – History of Hadoop – Hadoop overview – Use case of Hadoop – Hadoop distribution – HDFS – Processing data with Hadoop – Managing resources and Application with Hadoop YARN – Interacting with Hadoop Ecosystem

Unit: V	**Introduction to MangoDB**	18 Hours

What is MangoDB – Why MangoDB – Terms used in RDBMS and MangoDB – Data types in MangoDB -MangoDB query language. **Introduction to MachineLearning:** Introduction – Machine Learning Definition – Machine Learning Algorithms – Regression Model – Linear Regression – Clustering – Collaborative Filtering – Association Rule Mining – Decision Tree.

Total Lecture Hours	90 Hours

Book for Study:
1. SeemaAcharya, SubhashiniChellappan, Big Data and Analytics, Wiley, 2015, New Delhi. Unit I - Chapter 1(Full), Chapter 2.1 To 2.7, 2.9 To 2.13 Unit II - Chapter 3.2,3.5 To 3.8,3.10 To 3.14. Unit III - Chapter 4(Full) Unit IV- Chapter 5(Full) Unit V- Chapter 6(Full), Chapter 12(Full).
Books for Reference:
1. C. DT Editorial Services, Big Data, Black book, Ninth Edition, Dreamtech, 2016, New Delhi. 2. Michael Minelli, Michele Chambers, AmbigaDhiraj, Big Data, Big Analytics, Wiley, 2016, New Delhi. 3. Field Cady, The Data Science Handbook, Wiley, 1st Edition, 2017.
Web Reference:
1.https://www.slideshare.net/mohitsainirke/big-data-lecture-notes **2. https://www.ntnu.no/iie/fag/big/lessons/lesson1.pdf** **3.https://www.tutorialspoint.com/big_data_analytics/big_data_analytics_pdf_version.htm**

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1:	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	**Upto K3**
CO2:	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.	**Upto K3**
CO3:	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	**Upto K3**
CO4:	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.	**Upto K4**
CO5:	Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.	**Upto K4**

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	3	3	3	3	2
CO 2	2	2	2	2	2	3
CO 3	2	3	2	2	1	3
CO 4	3	2	2	1	2	3
CO 5	2	2	3	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	BIG DATA ANALYTICS	Hrs	Mode
I	**Types of Digital Data:** Classification of Digital Data**. Introduction to Big Data:** Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges in Big Data – Big Data definition – Other characteristics of Data – Need of Big Data – Traditional Business Intelligence (BI) vs Big Data – A typical Data Warehouse environment – A typical Hadoop environment – New things - Changes - Realms of Big Data.	18	ICT
II	**Big Data Analytics:** Big Data Analytics – Classification of Analytics – Greatest challenges thatprevent business from capitalizing on Big Data – Top challenges facing Big Data – Importance ofBig Data Analytics – Data Science – Data Scientist – Terminologies used in Big DataEnvironment – BASE – Analytics tool.	18	ICT
III	**The Big Data Technology Landscape:**NoSQL – Types of NoSQL Database – Need of NoSQL? – Advantages of NoSQL – Use of NoSQL in Industry – SQL vsNoSQL – Comparison of SQL, NoSQL and NewSQL. **Hadoop:** Features of Hadoop – Advantages of Hadoop – Overview of Hadoop – Hadoop distribution – Hadoopvs SQL – Integrated Hadoop System – Cloud-Based Hadoop Solutions.	18	ICT
IV	**Introduction to Hadoop:** Introducing Hadoop – Need of Hadoop – Need of RDBMS – RDBMS vsHadoop – Distributed computing challenges – History of Hadoop – Hadoop overview – Use case of Hadoop – Hadoop distribution – HDFS – Processing data with Hadoop – Managing resources and Application with Hadoop YARN – Interacting with Hadoop Ecosystem	18	ICT
V	**Introduction to MangoDB:** What is MangoDB – Why MangoDB – Terms used in RDBMS and MangoDB – Data types in MangoDB - MangoDB query language. **Introduction to MachineLearning:** Introduction – Machine Learning Definition – Machine Learning Algorithms – Regression Model – Linear Regression – Clustering – Collaborative Filtering – Association Rule Mining – Decision Tree.	18	ICT

Course Designed by:Dr.M.Karthika & Mr.M.Rameshkumar

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A** **MCQs**		**Section B** **Short Answers**		**Section C** **Either or Choice**	**Section D** **Open Choice**
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**		
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**3**		**4**	**2**
		No. of Questions to be answered	**4**		**3**		**2**	**1**
		Marks for each question	**1**		**2**		**5**	**10**
		Total Marks for each section	**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**WIRELESS SENSOR NETWORKS**			
Course Code	**21PCSC42**	**L**	**P**	**C**
Category	**CORE**	6	-	4

Nature of Course:	EMPLOYABILITY	**SKILLORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- Able to list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks.
- To Implement and evaluate new ideas for solving wireless sensor network design issues.
- Understand the concepts and theories of networks and apply them in different situations to Classification of networks, performance analysis and implementation of new technologies.
- To identify the wireless sensor network platforms.
- To understand the WSN node Architecture and Network Architecture

Unit: I	**Overview Of Wireless Sensor Networks**	18 Hours

Overview Of Wireless Sensor Networks: Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

Unit: II	**Architectures**	18 Hours

Architectures : Single-Node Architecture - Hardware Components, Energy consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Unit: III	**Networking Sensors**	18 Hours

Networking Sensors: Physical Layer and Transceiver Design Considerations, MAC Protocols for WirelessSensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

Unit: IV	**Infrastructure Establishment**	18 Hours

Infrastructure Establishment: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

Unit: V	**Sensor Network Platforms And Tools**	18 Hours

Sensor Network Platforms And Tools: Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms,Node-level Simulators, State-centric programming.

Total Lecture Hours	90

Books for Study:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks",JohnWiley,2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information ProcessingApproach",Elsevier,2007.

Books for Reference:

1. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Web Reference:

1. https://www.w3schools.com/
2. https://www.electronicshub.org/wireless-sensor-networks-wsn/
3. https://www.elprocus.com/architecture-of-wireless-sensor-network-and-applications/

Course Outcome		K Level
CO1	Understand the basis of Sensors with its applications.	Upto K3
CO2	To learn the architecture and placement strategies of Sensors.	Upto K3
CO3	To analyze routing and congestion algorithms	Upto K3
CO4	To design, develop , and carry out performance analysis of sensors on specific applications	Upto K4
CO5	To explore and implement solutions to real world problems using sensor devices, enumerating its principles of working	Upto K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	3
CO 2	2	2	2	3	3	3
CO 3	1	1	1	2	2	3
CO 4	2	3	3	3	3	2
CO5	3	3	3	1	2	3

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	WIRELESS SENSOR NETWORKS	Hrs	Mode
I	**Overview Of Wireless Sensor Networks**: Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.	**18**	**Chalk &Talk,PPT**
II	**Architectures** :Single-Node Architecture - Hardware Components, Energy consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.	**18**	**Chalk &Talk,PPT**
III	**Networking Sensors**: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.	**18**	**Chalk &Talk,PPT**
IV	**Infrastructure Establishment**: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.	**18**	**Chalk &Talk,PPT**
V	**Sensor Network Platforms And Tools** :Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming	**18**	**Chalk &Talk,PPT**

Course Designed by:Mrs. K.Sandya&Mrs.T.Sujithra

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**3**		**4**	**2**
		No. of Questions to be answered	**4**		**3**		**2**	**1**
		Marks for each question	**1**		**2**		**5**	**10**
		Total Marks for each section	**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**DATA MINING LAB**			
Course Code	**21PCSCP5**	**L**	**P**	**C**
Category	**Core**	-	6	4

Nature of Course:	**EMPLOYABILITY**	✓	**SKILLORIENTED**	✓	ENTREPRENEURSHIP

Course Objectives:

- Understand the dataset functions.
- Understand the data sets and data preprocessing
- Learn to perform data mining techniques
- Perform tasks using a data mining toolkit
- Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression.

S.No.	List of Programs	Hours
1.	Build Data Warehouse and Explore WEKA	**90**
2.	Create a Weather Table with the help of Data Mining Tool WEKA.	
3.	Create a employee Table with the help of Data Mining Tool WEKA.	
4.	Apply Pre-Processing techniques to the training data set of Weather Table	
5.	Apply Pre-Processing techniques to the training data set of Employee Table	
6.	Normalize Weather Table data using Knowledge Flow.	
7.	Normalize Employee Table data using Knowledge Flow.	
8.	Demonstrate performing association rule mining on datasets	
9.	Demonstrate performing classification on data sets	
10.	Demonstrate performing clustering on data sets	
	Total Lecture Hours	**90**

Books for Reference:

1. Parteek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, Cambridge University Press,2019.
2. Chris Pal, Ian Witten, Ebie Frank, Mark Hall,Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann; 4th edition 2016.

Web Reference:

1. https://www.cs.waikato.ac.nz/ml/weka/
2. https://www.tutorialspoint.com/weka/index.htm
3. https://wekatutorial.com/

Course Outcome		K Level
CO1	Ability to understand the various kinds oftools.	**Upto K2**
CO2	Demonstrate the classification, clustering and etc. in large datasets	**Upto K3**
CO3	Ability to add mining algorithms as a component to the exitingtools.	**Upto K3**
CO4	Ability to apply mining techniques for realisticdata.	**Upto K4**
CO5	To obtain Practical Experience Working with all real datasets.	**Upto K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	3
CO 2	2	2	3	3	3	2
CO 3	2	1	2	2	2	3
CO 4	2	3	2	2	1	2
CO5	3	3	2	2	2	3

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

S. No.	List of Programs	Hrs	Mode
1.	Build Data Warehouse and Explore WEKA	90	Lab Demonstrations
2.	Create a Weather Table with the help of Data Mining Tool WEKA.		
3.	Create a employee Table with the help of Data Mining Tool WEKA.		
4.	Apply Pre-Processing techniques to the training data set of Weather Table		
5.	Apply Pre-Processing techniques to the training data set of Employee Table		
6.	Normalize Weather Table data using Knowledge Flow.		
7.	Normalize Employee Table data using Knowledge Flow.		
8.	Demonstrate performing association rule mining on datasets		
9.	Demonstrate performing classification on data sets		
10.	Demonstrate performing clustering on data sets		

Course Designed by:Dr.M.Karthika & Mrs.M.MuthuLakshmi

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**PROJECT**			
Course Code	**21PCSPR1**	**L**	**P**	**C**
Category	**CORE**	-	6	6

Nature of course:	**EMPLOYABILITY**	✓	**SKILLORIENTED**	✓	**ENTREPRENEURSHIP**	✓

COURSE OBJECTIVES:

- Students are able to develop an ability to design and implement a software.
- Students will be able to select individually Commercial or Technical Project based on Application Development Technologies.
- Students will be able to know the technologies they can develop the software.
- Students will be able to Facilitates experiential learning.
- Students will be able to do Real time projects.

	➢ Title ➢ Synopsis ➢ Introduction ➢ Module description ➢ Existing and proposed system ➢ Data Flow Diagram ➢ System Flow Diagram ➢ Entity Relationship Diagram ➢ Form Design ➢ Database Design ➢ Testing ➢ Implementation ➢ Form Design	**90 Hours**
	Total Lecture Hours	**90 Hours**

Books for Reference:

1. Mike Holcombe, "Running an Agile Software Development Project" Wiley, 2008
2. Laura M. Leventhal, Julie A. Barnes "Usability Engineering: Process, Products, and Examples,", Pearson/Prentice Hall, 2008
3. Orit Hazzan, Yael Dubinsky, "Agile software engineering", Springer,2014
4. Jakob Nielsen, "Usability Engineering", Academic Press, 199

Web Reference:

1. https://www.upgrad.com/blog/web-development-project-ideas-for-beginners/
2. https://www.geeksforgeeks.org/web-development-project-ideas/
3. https://raddevon.com/articles/10-great-web-development-learning-project-ideas/
4. https://www.edx.org/course/project-management-for-development

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Design and implement a software with a good aesthetic sense of designing and latest technical know-how's.	**K3**
CO2	Project one that involves practical work for understanding and solving problems in the field of computing.	**K3**

CO3	To familiar with any software and develop tools	**K3**
CO4	To develop a software or application.	**K4**
CO5	To create applications using Languages	**K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	3	3	3
CO 2	2	2	2	2	3	2
CO 3	2	1	2	2	3	3
CO 4	2	3	2	3	1	2
CO 5	3	3	2	2	2	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –**Introductory Level

LESSON PLAN

Module	PROJECT	Hrs	Mode
I	• Title • Synopsis • Introduction	**18**	**Practical**
II	• Module description • Existing and proposed system	**18**	**Practical**
III	• Data Flow Diagram • System Flow Diagram • Entity Relationship Diagram	**18**	**Practical**
IV	• Form Design • Database Design	**18**	**Practical**
V	• Testing • Implementation	**18**	**Practical** **Presentation**

Course Designed by: Dr.G.Devika & Dr.S.Shaik Parveen

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**CLOUD COMPUTING**			
Course Code	**21PCSE41**	**L**	**P**	**C**
Category	**ELECTIVE**	6	-	6

Nature of Course:	EMPLOYABILITY	**SKILLORIENTED**	✓	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

Unit: I	**Introduction & Principles of Parallel and Distributed Computing**	18 Hours

Introduction: Cloud computing at a glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies.**Principles of Parallel and Distributed Computing:** Eras of Computing, Parallel Vs Distributed computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing.

Unit: II	**Virtualization and Cloud Computing Architecture**	18 Hours

Virtualization: Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples. **Cloud Computing Architecture:** Introduction, Cloud reference model, Types of clouds, Economics of the cloud, open challenges.

Unit: III	**Aneka and Concurrent Computing**	18 Hours

Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud programming and Management. **Concurrent Computing : Thread Programming :**Introducing Parallelism for Single machine Computation, Programming Application with Threads, Multithreading with Aneka, Programming Applications with Aneka Threads.

Unit: IV	**High- Throughput Computing and Data Intensive Computing**	18 Hours

High- Throughput Computing: Task Programming: Task Computing, Task-based Application Models, Aneka Task-Based Programming. **Data Intensive Computing: Map-Reduce Programming:** Whatis Data-IntensiveComputing, Technologies for Data-Intensive Computing, Aneka MapReduceProgramming.

Unit: V	**Cloud Platforms in Industry, Cloud Applications and Advanced Topics in Cloud Computing**	18 Hours

Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Observations. **Cloud Applications:** Scientific Applications, Business and Consumer Applications. **Advanced Topics in Cloud Computing:** Energy Efficiency in Clouds, Market Based Management of Clouds , Federated Clouds/ InterCloud, Third Party Cloud Services.

Total Lecture Hours	90

Books for Study:

1. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, " Mastering Cloud Computing Foundations and ApplicationsProgramming ", McGraw Hill Education, 2013.

Books forReference:

1. Michael Miller, "Cloud Computing", Pearson Education,New
2. Haley Beard, Cloud Computing Best Practices for Managing and MeasuringProcesses for On- demand Computing, Applications and Data Centers in theCloud with SLAs, Emereo Pty Limited, July 2008.
3. Cloud Application Architectures, George Reese, ISBN: 8184047142,Shroff/O' Reilly,2009.

Web Reference:

1. https://www.w3schools.com/
2. https://www.javatpoint.com/cloud-computing-tutorial
3. https://www.simplilearn.com/cloud-computing-tutorial-video
4. https://onlinecourses.nptel.ac.in/noc21_cs14/

Course Outcome		K Level
CO1	Understand the functionality of the various cloud and services provided by them.	Upto K3
CO2	Appreciate the strengths and limitations of various cloud models with virtualization.	Upto K3
CO3	Explain and implementation of task Scheduling algorithms.	Upto K4
CO4	Describe different methodologies used in cloud and cloud services.	Upto K4
CO5	Build a private cloud	Upto K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	3
CO 2	2	2	2	3	3	3
CO 3	2	3	2	3	3	2
CO 4	2	3	3	3	3	3
CO5	3	3	3	3	2	3

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	CLOUD COMPUTING	Hrs	Mode
I	**Introduction:** Cloud computing at a glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies. **Principles of Parallel and Distributed Computing:** Eras of Computing, Parallel Vs Distributed computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing.	18	**Chalk & Talk, PPT, Online course**
II	**Virtualization:** Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples **Cloud Computing Architecture:** Introduction, Cloud reference model, Types of clouds, Economics of the cloud, open challenges.	18	**Chalk & Talk, PPT, Online course**
III	Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud programming and Management. Concurrent Computing: Thread Programming :Introducing Parallelism for Single machine Computation, Programming Application with Threads, Multithreading with Aneka, Programming Applications with Aneka Threads.	18	**Chalk & Talk, PPT**
IV	**High- Throughput Computing:** Task Programming: Task Computing, Task-based Application Models, Aneka Task-Based Programming. **Data Intensive Computing:** Map-Reduce Programming: Whatis Data-IntensiveComputing, Technologies for Data-Intensive Computing, Aneka MapReduceProgramming.	18	**Chalk & Talk, PPT**
V	**Cloud Platforms in Industry:** Amazon Web Services, Google AppEngine, Microsoft Azure, Observations. **Cloud Applications:** Scientific Applications, Business and Consumer Applications. **Advanced Topics in Cloud Computing:** Energy Efficiency in Clouds, Market Based Management of Clouds , Federated Clouds/ InterCloud, Third Party Cloud Services.	18	**Chalk & Talk, PPT, Online course**

Course Designed by:Dr.S. ShaikParveen & Mrs.K.Sandya

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**BLOCK CHAIN FUNDAMENTALS**				
Course Code	**21PCSE42**		**L**	**P**	**C**
Category	**Elective**		6	-	6
Nature of course:	**EMPLOYABILITY**	✓ SKILLORIENTED	ENTREPRENEURSHIP		

COURSE OBJECTIVES:

- Students are able to decompose a block chain system's fundamental components, how they fit together and examine a decentralization using block chain.
- Students will be able to explain how Crypto currency works, from when a transaction is created to when it is considered part of the block chain.
- Students will be able to explain the components of Ethereum and Programming Languages for Ethereum.
- Students will be able to study the basics hyperledger and Web3.
- Students will be able to provide a details of alternative blockchain and blockchain projects in different.

Unit: I	**Introduction to block chain & Evolution of block chain:**	18 Hours

Block chain Characteristics- Opportunities Using Block chain- History of Block chain – **Evolution Of Block Chain:** Evolution of Computer Applications-Centralized Applications- Decentralization Applications– Stages in Block chain –Consortia – Restriction on Sharing Ledgers- Forks-Public Block chain Environments –Types of Players in Block chain Ecosystem.

Unit: II	**Block Chain Concepts :**	18 Hours

Introduction – Chaining of Blocks- Hashing-Merkle Tree-Consensus-Mining and Finalizing Blocks-Data Storage on Block chain-Wallets- Types of Block chain Nodes – Risk Associated with Block chain Solutions- Life Cycle of Block chain Transaction

Unit: III	**Architecting block chain solutions:**	18 Hours

Introduction- Obstacles for Use of Block chain – Block chain Relevance Evaluation Framework – Block chain Solutions Reference Architecture - - Types of Block chain Applications –Typical Solution Architecture for Enterprises Use Cases- Architecture Considerations –Architecture with Block chain Platforms – Approach for Designing Block chain Applications.

Unit: IV	**Ethereum block chain implementation& hyper ledger block chain implementation:**	18 Hours

Ethereum Virtual Machine – Smart Contract Programming – Integrated Development Environment-Truffle Framework – Unit Testing – **Hyper ledger Block chain Implementation:** Hyper ledger Fabric – FabCar Use Case Implementations – Invoking Chain code Functions Using Client Application.

Unit: V	**Advanced concepts in block chain:**	18 Hours

Inter Planetary File System – Zero – Knowledge Proofs – Oracles – Self –Sovereign Identify – Block chain with IoT and AI / ML- Quantum Computing and Block chain – Initial Coin Offerings- Blockchain and its Future Potential.

Total Lecture Hours	90 Hours

Books for Study:

1. Sham M R, AmbadasTulajadasChoudhari, ArshadSarfarzAriff, Deepak P N, AmitJunankar, "**Blockchain for Enterprise Application Developers**", First Edition,

Wiley Emerging Technology Series, 2020. Unit I : Chapter 1 and 2 (Full) Unit II : Chapter 3 (Full) Unit III : Chapter 4 (Full) Unit IV :Chapter 5 and 6(Full) Unit V : Chapter 7 (Full)
Books for Reference:
1. Kumar Saurabh, AshutoshSaxena,"Blockchain Technology Concepts and Applications",Wiley India. 2. SatyaPrakashYadav, SubiyaZaidi,"Blockchain and Cryptocurrency" Dreamtech Press.
Web Reference:
1. NPTEL online course : **https://nptel.ac.in/courses/106/104/106104220/#** 2. Udemy: **https://www.udemy.com/course/build-your-blockchain-az/** 3. EDUXLABS Online training :**https://eduxlabs.com/courses/blockchain-technologytraining/?tab=tab-curriculum**

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1:	Review the fundamental concepts of ablockchains and emerging trends in blockchain.	**Upto K3**
CO2:	Establish deep understanding of the Ethereum model, its consensus model, code execution.	**Upto K3**
CO3:	Analyze, identify and Aware of different approaches to developing decentralized applications.	**Upto K3**
CO4:	Identify the architectural components of a Hyper ledger and its development framework.	**Upto K4**
CO5:	Apply the learning of solidity and de-centralized apps on Ethereum.	**Upto K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	3
CO 2	2	2	2	3	3	3
CO 3	2	3	2	3	3	2
CO 4	2	3	3	3	3	3
CO5	3	3	3	3	2	3

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	BLOCK CHAIN FUNDAMENTALS	Hrs	Mode
I	Block chain Characteristics- Opportunities Using Block chain- History of Block chain – Evolution Of Block Chain: Evolution of Computer Applications- Centralized Applications- Decentralization Applications – Stages in Block chain –Consortia – Restriction on Sharing Ledgers- Forks- Public Block chain Environments – Types of Players in Block chain Ecosystem.	18	Chalk & Talk, PPT
II	Introduction – Chaining of Blocks- Hashing-Merkle Tree-Consensus-Mining and Finalizing Blocks-Data Storage on Block chain-Wallets- Types of Block chain Nodes – Risk Associated with Block chain Solutions- Life Cycle of Block chain Transaction	18	Chalk & Talk, PPT
III	Introduction- Obstacles for Use of Block chain – Block chain Relevance Evaluation Framework – Block chain Solutions Reference Architecture - - Types of Block chain Applications –Typical Solution Architecture for Enterprises Use Cases- Architecture Considerations –Architecture with Block chain Platforms – Approach for Designing Block chain Applications.	18	Chalk & Talk, PPT
IV	Ethereum Virtual Machine – Smart Contract Programming – Integrated Development Environment-Truffle Framework – Unit Testing – Hyper ledger Block chain Implementation: Hyper ledger Fabric – FabCar Use Case Implementations – Invoking Chaincode Functions Using Client Application.	18	Chalk & Talk, PPT
V	InterPlanetary File System – Zero – Knowledge Proofs – Oracles – Self – Sovereign Identify – Block chain with IoT and AI / ML- Quantum Computing and Block chain – Initial Coin Offerings- Blockchain and its Future Potential.	18	Chalk & Talk, PPT

Course Designed by:Dr.R.Bagavathi Lakshmi & Mr.M.Rameshkumar

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A** **MCQs**		**Section B** **Short Answers**		**Section C Either or Choice**	**Section D Open Choice**
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**		
CI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AI	**CO2**	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
AII	**CO4**	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	**SOFTWARE PROJECT MANAGEMENT**			
Course Code	**21PCSE43**	**L**	**P**	**C**
Category	**ELECTIVE**	6	-	6

Nature of course:	**EMPLOYABILITY**	✓	SKILLORIENTED	ENTREPRENEURSHIP

COURSE OBJECTIVES:

- Identify the different project contexts and suggest an appropriate management strategy.
- Practice the role of professional ethics in successful software development.
- Identify and describe the key phases of project management.
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
- Able to plan and implement a software project management activity, and to complete a specific project in time with the available budget.

Unit: I	**Introduction:**	18 Hours

Introduction – why software project management important? – What is a project? – software projects Vs other type of project, Contract Management and Technical Project Management, Activities covered by Software Project Management, Plans, Methods and Methodologies, Project Charter, Stakeholders, setting objectives, the business case, project success and failure, what is management?, Management Control, project management life cycle, traditional Vs Modern Project Management Practices, **Project Evaluation and Programme Management –** Business Case – Project Portfolio Management, Evaluation of Individual Projects, Cost Benefit Evaluation Techniques, Risk Evaluation, Programme Management, Managing the allocation of Resources within Programmes, strategic Programme Management, Creating a Programme, Aids to Programme Management, **An overview of Project Planning – Introduction to Step Wise Project Planning –** Select Project, Identify Project Scope and objectives, identify project infrastructure, Analyse Project Characteristics, Identify Project Products and Activities, Estimate Effort for each Activity, Identify Activity Risks, Allocate Resources, Review Publicize Plan.

Unit: II	**Selection of an Appropriate Project Approach**	18 Hours

Choosing Methodologies and Technologies, Software Process and Process models, Structure Vs Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping, Other ways of Categorizing Prototypes, Incremental Delivery, Rapid Application Development, Agile Methods, Extreme Programming, Scrum, Lean Software Development, Managing Iterative Process**,** **Software Effort Estimation** – Where the Estimation Done?, Problems with Over and Under Estimates, Basis for Software Estimating, Software Effort Estimation Techniques, Bottom Up Estimating , The Top Down Approach and Parametric Models, Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, Cosmic Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating rules of Thumb, **Activity Planning –** Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Activities, Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities

Unit: III	**Risk Management**	18 Hours

Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risks, Risk Identification, Assessment, Planning, Management, Evaluating Risks to the Schedule, Boehms Top 10 Risks and Counter Measures, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts, **Resource Allocation –** Nature of Resources – Identifying Resource Requirements, Scheduling Resources, Creating Critical Paths, Counting the Cost, Being Specific, Publishing the Resource Schedule, Cost Schedule, Scheduling Sequence, **Monitoring and Control** - Creating the Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, SCM

Unit: IV	**Managing Contracts**	18 Hours

Types of Contract, Stages in Contract, Typical terms of Contract, Contract Management, Acceptance, **Managing People in Software Environments –** Understanding Behaviour, Organizational Behaviour, Selecting the Right Person for the job, Instruction in the Best Methods, Motivation, The Oldham-Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety, Some Ethical and Professional Concerns, **Working in Teams** - Becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leaderships

Unit: V	**Software Quality**	18 Hours

The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product Vs Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans, **Project Control –** Reasons for Project Closure Process, Performing a Financial Closure, Project Closeout Report

	Total Lecture Hours	90 Hours

Books for Study:

2. Bob Hughes, Mike Cottrell, Rajib Mall, SOFTWARE PROJECT MANAGEMENT, Mc GRAW HILL.
   - UNIT-I : Chapter 1.1 - 1.17, 2.1 – 2.13, 3.1 – 3.11
   - UNIT-II : Chapter 4.1 – 4.19, 5.1 – 5.17, 6.1 – 6.16
   - UNIT-III : Chapter 7.1 – 7.14, 8.1 – 8.10, 9.1 – 9.11
   - UNIT –IV : Chapter 10.1 – 10.6, 11.1 – 11.11, 12.1 – 12.9
   - UNIT-V : Chapter 13.1 – 13.14, 14.1 – 14.5

Books for Reference:

1. Joel Henry, "Software Project Management", 1st Edition, Pearson Education, 2006.
2. PankajJalote, "Software Project Management in practice", 1st Edition, Pearson Education, 2005.

Web Reference:

1. https://www.tutorialspoint.com/software_engineering/software_project_management.htm
2. https://www.javatpoint.com/software-project-management

Course Outcomes:		**K Level**
At the end of the Course the students will be able to		
CO1	Apply project management concepts and techniques to an IT project.	UptoK3
CO2	Identify issues that could lead to IT project success or failure	UptoK3
CO3	Explain project management in terms of the software development process	Upto K3
CO4	Describe the responsibilities of IT project managers	Upto K4
CO5	Apply project management concepts through working in a group as team leader or active team member on an IT project	Upto K4

CO & PO Mappings:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	2
CO 2	2	2	3	3	3	2
CO 3	3	2	3	2	2	3
CO 4	2	2	3	2	2	2
CO 5	3	3	2	3	3	3

***3 –**Advanced Application; **2 –** Intermediate Development; **1 –**Introductory Level

LESSON PLAN

UNIT	Software Project Management	Hrs	Mode
I	**Introduction –** why software project management important? – What is a project? – software projects Vs other type of project, Contract Management and Technical Project Management, Activities covered by Software Project Management, Plans, Methods and Methodologies, Project Charter, Stakeholders, setting objectives, the business case, project success and failure, what is management?, Management Control, project management life cycle, traditional Vs Modern Project Management Practices, **Project Evaluation and Programme Management –** Business Case – Project Portfolio Management, Evaluation of Individual Projects, Cost Benefit Evaluation Techniques, Risk Evaluation, Programme Management, Managing the allocation of Resources within Programmes, strategic Programme Management, Creating a Programme, Aids to Programme Management, **An overview of Project Planning – Introduction to Step Wise Project Planning –** Select Project, Identify Project Scope and objectives, identify project infrastructure, Analyse Project Characteristics, Identify Project Products and Activities, Estimate Effort for each Activity, Identify Activity Risks, Allocate Resources, Review Publicize Plan.	**18**	**Chalk & Talk, PPT**
II	**Selection of an Appropriate Project Approach –** Choosing Methodologies and Technologies, Software Process and Process models, Structure Vs Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping, Other ways of Categorizing Prototypes, Incremental Delivery, Rapid Application Development, Agile Methods, Extreme Programming, Scrum, Lean Software Development, Managing Iterative Process**, Software Effort Estimation** – Where the Estimation Done?, Problems with Over and Under Estimates, Basis for Software Estimating, Software Effort Estimation Techniques, Bottom Up Estimating , The Top Down Approach and Parametric Models, Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, Cosmic Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating rules of Thumb, **Activity Planning –** Objectives of Activity Planning, When to Plan, Project	**18**	**Chalk & Talk, PPT**

	Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Activities, Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities.		
III	**Risk Management –** Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risks, Risk Identification, Assessment, Planning, Management, Evaluating Risks to the Schedule, Boehms Top 10 Risks and Counter Measures, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts, **Resource Allocation –** Nature of Resources – Identifying Resource Requirements, Scheduling Resources, Creating Critical Paths, Counting the Cost, Being Specific, Publishing the Resource Schedule, Cost Schedule, Scheduling Sequence, **Monitoring and Control** - Creating the Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, SCM	**18**	**Chalk & Talk, PPT**
IV	**Managing Contracts –** Types of Contract, Stages in Contract, Typical terms of Contract, Contract Management, Acceptance, **Managing People in Software Environments –** Understanding Behaviour, Organizational Behaviour, Selecting the Right Person for the job, Instruction in the Best Methods, Motivation, The Oldham-Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety, Some Ethical and Professional Concerns, **Working in Teams -** Becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leaderships	**18**	**Chalk & Talk, PPT**
V	**Software Quality –** The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product Vs Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans, **Project Control –** Reasons for Project Closure Process, Performing a Financial Closure, Project Closeout Report	**18**	**Chalk &Talk, PPT**

Course Designed by:Dr.BagavathiLakshmi & Mrs.T.Sujithra.

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**		**Section C**	**Section D**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K – Level**	**Either or Choice**	**Open Choice**
CI AI	**CO1**	Up to K2	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO2	Up to K3	2	**K1,K2**	2	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	Up to K3	2	**K1,K2**	1	**K1**	**2(K3,K3)**	**1(K3)**
	CO4	Up to K4	2	**K1,K2**	2	**K2**	**2(K4,K4)**	**1(K4)**
Question Pattern CIA I & II	No. of Questions to be asked		**4**		**3**		**4**	**2**
	No. of Questions to be answered		**4**		**3**		**2**	**1**
	Marks for each question		**1**		**2**		**5**	**10**
	Total Marks for each section		**4**		**6**		**10**	**10**

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-		
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO 1	K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
2	CO 2	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CO 3	K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO 4	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CO 5	K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be Asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(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 (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5		-	-	5	4.17	17
K2	5	10	-	-	15	12.5	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	33.33	33
Marks	10	10	50	50	120	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

Section A (Multiple Choice Questions) Answer All Questions			(10x1=10 marks)
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	