

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 x 01= 04 Marks

Part –B

Three short answers questions (answer all) 3 x 02= 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 inculcate the students professionally sound in computer efficacy with sufficient soft skills and to be in par with the industry demands.

MISSION

To develop firm in computer concepts and design with practical skills to the students.

The 12 Graduate Attributes*:

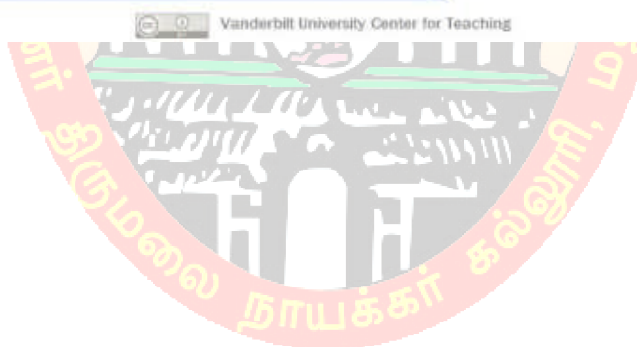
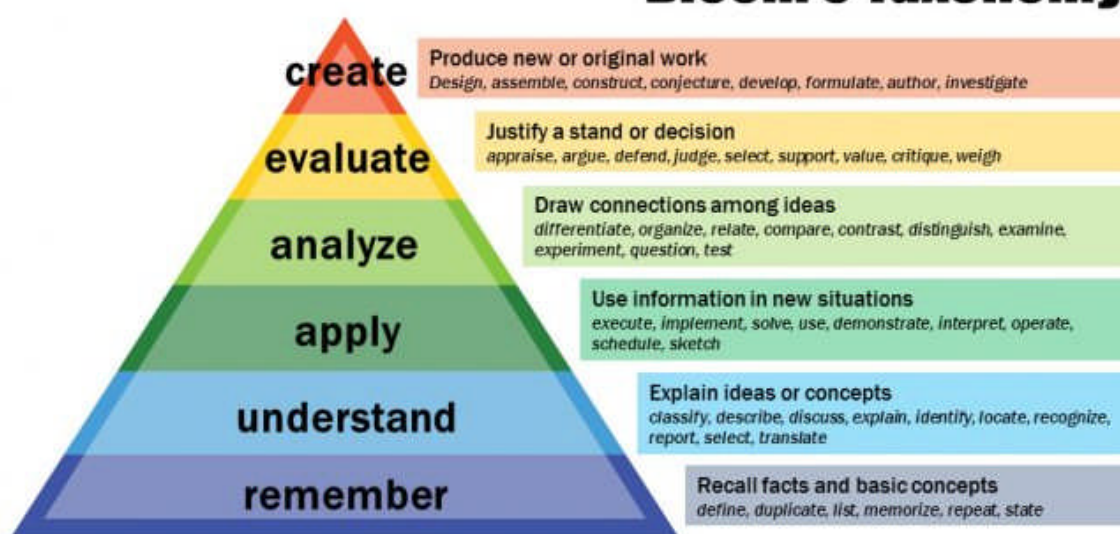
1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, 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	Impact on Society

	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.	
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

Bloom's Taxonomy



PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1:	Post Graduates are prepared to apply broad knowledge of Computer Science and a focused understanding of their area of expertise
PEO2:	Post Graduates will be capable of pursuing professional careers or to take up research programmes.
PEO3:	Post Graduates are prepared to survive in rapidly changing technology and engage in life-long learning.
PEO4:	Post Graduates will be able to develop team work capability so that they can work on multidisciplinary projects and exhibits high level of professional and ethical values.
PEO5:	Post Graduates will be able to engage in sustainable development and demonstrate data analysis skills for effective interpretation and decision making to solve real life problems.

PROGRAMME OUTCOMES (POs)

PO1:	Demonstrate analytical and practical knowledge in the field of Science, Technology and other domains.
PO2:	Express their disciplinary knowledge with others effectively in both oral and written form in an organized manner.
PO3:	Make proficiency by using Computer Technology in learning activities and update their knowledge, skills to fulfill the requirements at the workplace in their life span.
PO4:	Employ critical and analytical thinking in understanding the concepts of Mathematical & Computing Sciences and qualify competitive examinations like CSIR NET/ SET/ TET etc.
PO5:	Identify Mathematical and Computational methods in order to solve critical problems.
PO6:	Work independently and do detailed study of various concepts of Science.
PO7:	Plan, execute, report the results of an experiment/investigation together as a group/team with interest and work efficiently as a member of a team.

PROGRAM SPECIFIC OUTCOME (PSOs)

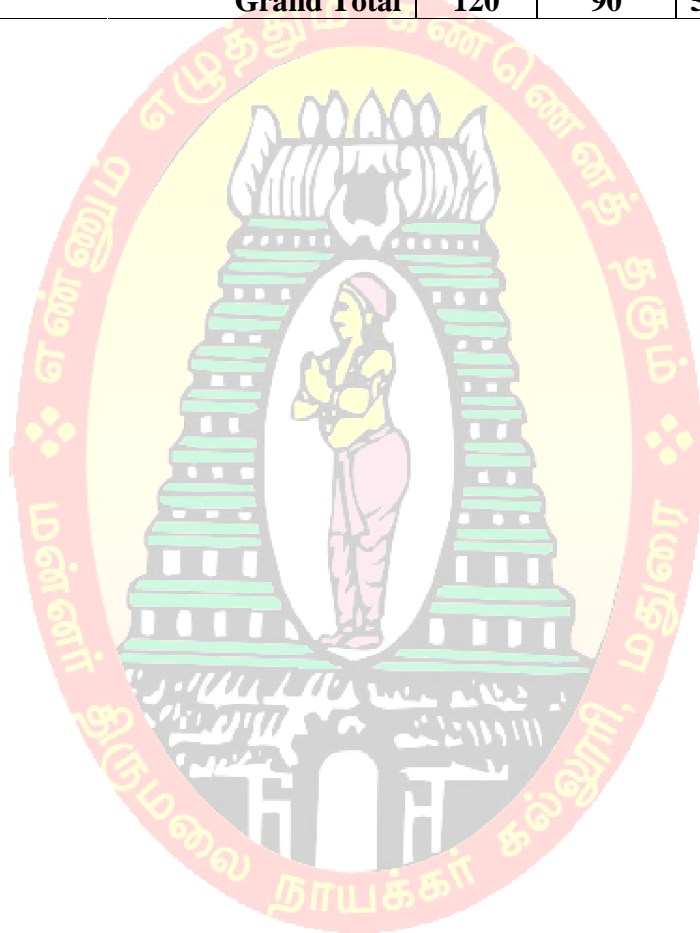
PSO1:	Possess strong foundation on various dimensions of algorithms, networking and software development with social impact.
PSO2:	Acquire capabilities towards innovation and creativity in problem solving skills in IT industry.
PSO3:	Develop ability to communicate, comprehend and write effective reports and design documentation and effectively respond to clear instructions.
PSO4:	Work effectively as a member and leader in teams in multi-disciplinary setting and develop as a successful entrepreneur.
PSO5:	Develop and inculcate positive attitude to become a responsible good citizen by applying professional ethics, accountability with greater awareness about culture and value system.
PSO6:	Comprehend, explore and build up computer programs in the areas allied to Algorithms, Artificial Intelligence, Theory of Computation and Cyber Security for efficient design of computer-based systems of varying complexity.

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					
21PCSN21	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
21PCSCP4	Data mining Lab	6	4	25	75	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







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	ENTREPRENURSHIP		
COURSE OBJECTIVES:						
<ul style="list-style-type: none">• 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 Servlet-Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies- URL Rewriting-Other Capabilities-Data Storage						

Servlets 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://freevidelectures.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	PO 7
CO 1	1	3	3	3		2	2
CO 2	2		2	2	2	2	
CO 3		3	2	2	1	2	2
CO 4	3	2		1		1	3
CO 5	2	2	3	2	2		

*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**

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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of Questions	K - Level	No. of Questions	K - Level		
CIA I	CO1	K 3	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1,K2	2	K1,K2	2(K3&K3)	2(K3)
CIA II	CO3	K4	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO4	K4	2	K1,K2	2	K1,K2	2(K4&K4)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4	K1,K2	3	K1,K2	4	3
		No. of Questions to be answered	4	K1,K2	3	K1,K2	2	2
		Marks for each question	1	K1,K2	2	K1,K2	5	20
		Total Marks for each section	4	K1,K2	6	K1,K2	10	20

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	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	20	30	50	83	83
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	--	4	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	10	10	20	33	33
	K4	-	-	10	20	30	50	50
	Marks	4	6	20	30	60	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	0	4
Nature of course:	EMPLOYABILITY	SKILL ORIENTED	✓	ENTREPRENURSHIP		
COURSE OBJECTIVES:						
<ul style="list-style-type: none">To provide mathematical approach for Analysis of AlgorithmsTo solve problems using various strategiesTo 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's 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	PO 7
CO 1	3	2	-	2	2	2	
CO 2	2	2	2	2	3	2	2
CO 3	3	1	2	2	2	-	3
CO 4	2	2		2	1	2	1
CO 5	2	2	2	2	2	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's 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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of Questions	K - Level	No. of Questions	K - Level		
CIA I	CO1	K 3	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1,K2	2	K1,K2	2(K3&K3)	2(K3)
CIA II	CO3	K4	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO4	K4	2	K1,K2	2	K1,K2	2(K4&K4)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4	K1,K2	3	K1,K2	4	3
		No. of Questions to be answered	4	K1,K2	3	K1,K2	2	2
		Marks for each question	1	K1,K2	2	K1,K2	5	20
		Total Marks for each section	4	K1,K2	6	K1,K2	10	20

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	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	20	30	50	83	83
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	--	4	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	10	10	20	33	33
	K4	-	-	10	20	30	50	50
	Marks	4	6	20	30	60	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	✓	ENTREPRENURSHIP	✓
Course Objectives:						
This module aims to introduce students to use quantitative 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/prview

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
CO 1	3	3	3	2	2
CO 2	3	2	3	2	2
CO 3	3	3	3	2	3
CO 4	3	2	2	3	3
CO 5	3	2	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		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K - Level	No. of. Questions	K - Level		
CI AI	CO1	K2	2	K1	1	K2	5(k2)	10(k4)
	CO2	K3	2	Up to K2	2	Up to K3	5(k2&k3)	20(k3 & k4
CI AII	CO3	K3	2	K1	1	K2	5(k2)	10(k4)
	CO4	K3	2	K2	2	Up to K3	5(k3)	20(k3& k4
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	10	20	33.33	33.33
	K4	-	-	-	10	10	16.67	16.67
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	10	20	33.33	33.33
	K4	-	-	-	10	10	16.67	16.67
	Marks	4	6	20	30	60	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	

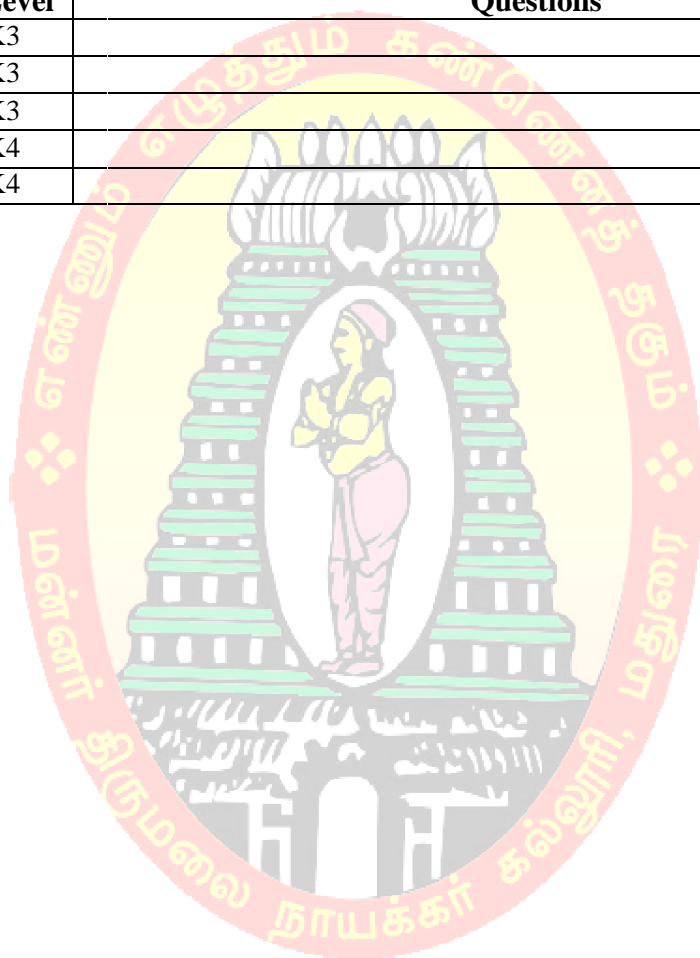
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels

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)
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2021-2022 and after)

Course Name	ADVANCED WEB TECHNOLOGY LAB					
Course Code	21PCSCP1			L	P	C
Category	Core			-	6	4
Nature of Course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP	
Course Objectives:						
<ul style="list-style-type: none">• 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.					90
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.					
	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	PO 7
CO 1	3	2	2	2	3	2	2
CO 2	2	2	2	2	3	2	3
CO 3		1	2	2		1	
CO 4	2		2	2	1	2	1
CO 5	3	3		2	2	3	2

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

LESSON PLAN

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

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



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

Course Name	ALGORITHMS LAB					
Course Code	21PCSCP2			L	P	C
Category	Core			-	6	4
Nature of Course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP	
COURSE OBJECTIVES:						
<ul style="list-style-type: none">• 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's algorithm.					
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 $S = \{S_1, S_2, \dots, S_n\}$ 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					

15	principle. 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 as sorting, 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	PO 7
CO 1	3	2	1	1	3	2	1
CO 2	2	3	2	2	3	2	3
CO 3	-	1	2	2	-	1	-
CO 4	2		2	1	1	2	1
CO 5	3	3		2	3	3	2

*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's algorithm.		
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 $S = \{S_1, S_2, \dots, S_n\}$ 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**





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		ENTREPRENURSHIP	
COURSE OBJECTIVES:						
<ul style="list-style-type: none">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 APPLLET 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, 5 th 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	PO7
CO1	3	-	3	2	3	3	3
CO2	2	2	2	3	3		2
CO3	2	3	-	3		2	
CO4			2	3	3	2	2
CO5	3	3	-	2	2	3	1

*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	18	Lecture and Chalk

	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.		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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of Questions	K - Level	No. of Questions	K - Level		
CIA I	CO1	K 3	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1,K2	2	K1,K2	2(K3&K3)	2(K3)
CIA II	CO3	K4	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO4	K4	2	K1,K2	2	K1,K2	2(K4&K4)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4	K1,K2	3	K1,K2	4	3
		No. of Questions to be answered	4	K1,K2	3	K1,K2	2	2
		Marks for each question	1	K1,K2	2	K1,K2	5	20
		Total Marks for each section	4	K1,K2	6	K1,K2	10	20

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	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	20	30	50	83	83
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	--	4	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	10	10	20	33	33
	K4	-	-	10	20	30	50	50
	Marks	4	6	20	30	60	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:						
<ul style="list-style-type: none">• 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 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/ood 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	K4

	appropriate UML notation.	
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	PO7
CO1	3	2	2	2	3	2	2
CO2	2		2	2	3	2	-
CO3	-	1	2	2		2	3
CO4	2	2		2	2	2	2
CO5	3	3	3	-	2	3	1

*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	18	Blackboard & PPT

	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.		
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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K - Level	No. of. Questions	K - Level		
CIA I	CO1	K 3	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1,K2	2	K1,K2	2(K3&K3)	2(K3)
CIA II	CO3	K4	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO4	K4	2	K1,K2	2	K1,K2	2(K4&K4)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4	K1,K2	3	K1,K2	4	3
		No. of Questions to be answered	4	K1,K2	3	K1,K2	2	2
		Marks for each question	1	K1,K2	2	K1,K2	5	20
		Total Marks for each section	4	K1,K2	6	K1,K2	10	20

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	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	20	30	50	83	83
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	--	4	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	10	10	20	33	33
	K4	-	-	10	20	30	50	50
	Marks	4	6	20	30	60	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		ENTREPRENURSHIP			
Course Objectives:								
<ul style="list-style-type: none">• 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. Silberschatz 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.tutorialspoint.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	PO7
CO 1		2		3	3	3	2
CO 2	2	2	2	2	3	2	3
CO 3	2		3		2		1
CO 4	3	2	2	3	3	2	
CO 5	3	3	3	2	2	3	

*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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of Questions	K - Level	No. of Questions	K - Level		
CIA I	CO1	K 3	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1,K2	2	K1,K2	2(K3&K3)	2(K3)
CIA II	CO3	K4	2	K1,K2	1	K1,K2	2(K3&K3)	1(K3)
	CO4	K4	2	K1,K2	2	K1,K2	2(K4&K4)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4	K1,K2	3	K1,K2	4	3
		No. of Questions to be answered	4	K1,K2	3	K1,K2	2	2
		Marks for each question	1	K1,K2	2	K1,K2	5	20
		Total Marks for each section	4	K1,K2	6	K1,K2	10	20

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	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	20	30	50	83	83
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	--	4	6	17
	K2	2	4	-	-	6	11	
	K3	-	-	10	10	20	33	33
	K4	-	-	10	20	30	50	50
	Marks	4	6	20	30	60	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	AVANCDDED JAVA PROGRAMMING LAB					
Course Code	21PCSCP3			L	P	C
Category	Core			-	6	4
Nature of Course:	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENURSHIP	
COURSE OBJECTIVES:						
<ul style="list-style-type: none">• 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
Books for Study:						
Books for Reference:						
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	PO7
CO1	3	3	3	2	3	3	2
CO2		3	2	3		3	2
CO3	2	2	3	2	2	3	
CO4	2		3	3	3		2
CO5	3	3	3		3	3	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	21PCSN21					L	P	C
Category	Non Major Elective					-	6	6
Nature of Course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP			
Course Objectives:								
<ul style="list-style-type: none">Introduces the basic features of Microsoft OfficeDevelops familiarity with Word, Excel, PowerPoint, email, and Internet basics.Learn the definition of the Internet and World Wide WebUnderstand how to access the Internet and WebPerform 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.							90
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.								
	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	PO7
CO 1	3	-	3	2	3	3	2
CO 2	2	2	-	3	3		3
CO 3	-	2	2	3	-	2	
CO 4	2	2	2	2	2	2	2
CO5	3	2	2	2	2	3	2

*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**