BCA

Syllabus

Program Code: UCA

2021-2022 onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Eligibility for Admission

Candidates should have passed the Higher Secondary Examination with 10 +2 pattern conducted by the Board of Higher Secondary Education, Govt. of Tamil Nadu or any other Examinations accepted by the Syndicate as equivalent there to and the candidate should have studied +2 level Mathematics with Physics/ Commerce/ Economics as subject of study in the 10 +2 pattern**Duration of the course**

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

Subjects of Study

Part I : Tamil / Company Secretarial Practice and Modern Office Management

Part II : English

Part III :

1. Core Subjects
2. Allied Subjects
3. Electives

Part IV :

1. Non Major Electives (II Year)
2. Skill Based Subjects
3. Environmental Studies - Mandatory Subject
4. Value Education - Mandatory Subject

Part V :

Extension Activities

Pattern of the question paper for the Continuous Internal Assessment

Note: Duration – 1 hour

(For Part I, Part II & Part III)

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 1 x 10 =10 Marks

Total 30 Marks

The scheme of Examination for Part-I, II & III

The components for continuous internal assessment are:

(60 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

Part-IV- Skill Based Papers / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects)
Pattern of the questions paper for the continuous Internal Assessment

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks**) and converted for 15 marks**

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks

Total	25 Marks

Summative Examination Pattern

Pattern of the Question Paper for Skill Based Papers (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks**)**

(15MCQ's from each unit)

Part-IV- Environmental Studies and Value Education

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	--15 marks
Project Report	--10 marks*****
Total	--25 marks

***** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

(Internal Assessment)

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks**) and converted for 15 marks**

Two tests and their average	--	15 marks
Project	--	10 marks

Total		25 Marks

Summative Examination Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks**)**

(15MCQ's from each unit)

Part V Extension Activities: (Maximum Marks: 100)

1. NCC
2. NSS
3. Physical Education
4. YRC
5. RRC
6. Health & Fitness Club
7. Eco Club
8. Human Rights Club

Pattern of the Question Paper for (Internal Examination & Summative Examination)

Internal Examinations	- - 40 Marks
Summative Examinations	- - 60 Marks
	100

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).

No separate pass minimum for the Internal Examinations.

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

Vision

To mould the students with good academic record in addition to sufficient soft skills and make them qualified computer professional in the global environment.

Mission

- To organize seminar, symposium, workshop keep pace with the current trends and enhance the talents of the students and motivate our students to acquire progressive and long term employment with well reputed companies.
- Empowering the youth in rural communities with computer education.
- To Provide students with the tools to become productive, participating global citizens and lifelong learners
- To enable the students to acquire globally competence through developing their problem solving skills and exposure to latest developments in area of computer applications
- To educate the students about their professional, social and ethical responsibilities

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

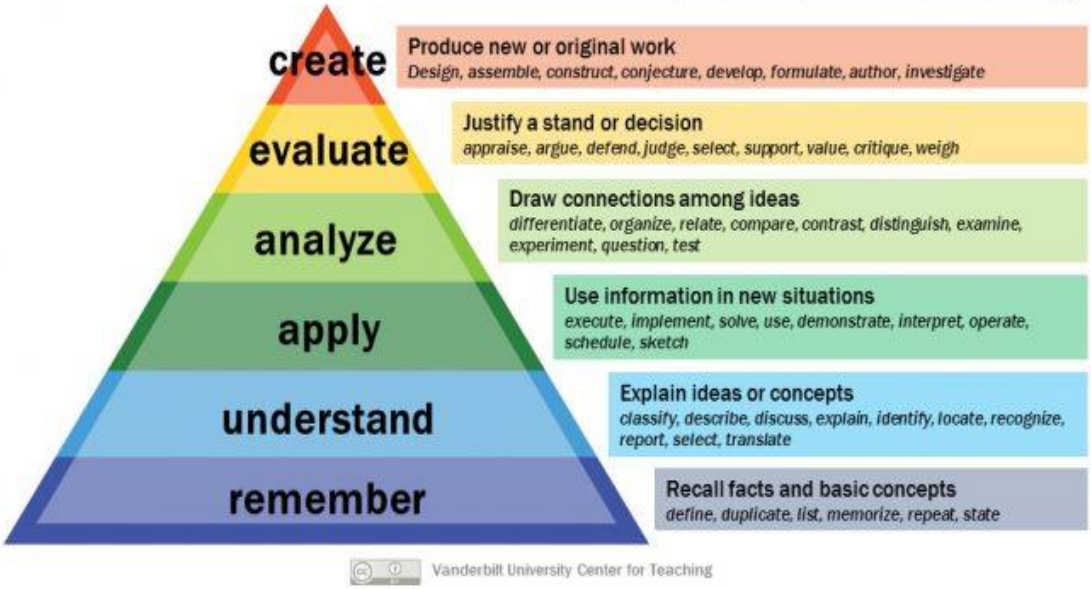
WA8	An ability to apply professional ethics, accountability, and equity.	Ethics and equity
WA12	An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge	Life long learning
WA5	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.	--
WA7	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.	--
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	Economics and Project Management

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO1:	Inculcate graduates to pursue variety of careers in IT industries by providing expected domain knowledge
PEO2:	Prepare to employ their skill with a strong base for higher Education and research activities in order to cater to the needs of industry and society
PEO3:	Excel as socially committed individual by providing technical and soft skills with ethical standards, nurture to be an effective team member, infuse leadership qualities and protect the environment
PEO4:	To be able to adapt to the evolving technical challenges and changing career opportunities**.**
PEO5:	Graduate of the program will have skills to develop applications with innovation
PEO6:	Implement their problem- solving skills in professional practices and face social, technical and business challenges.

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 OUTCOME (PSOs)	
PSO1:	Provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors
PSO2:	Analyze and synthesis computing systems through quantitative and qualitative techniques
PSO3:	Envisage and work on laboratory and multi- disciplinary tasks in computer applications.
PSO4:	Combination of computer application and allied subjects make them competent and face industrial challenges
PSO5:	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.
PSO6:	Acquiring In-depth knowledge & sustained learning leading to innovation, permutation, modernization and enrichment to fulfill global interest..

Bloom's Taxonomy



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous), Pasumalai

BCA Curriculum

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

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG11	**இக்காலக் கவிதையும் நாடகமும்**	6	3	25	75	100
Part – II	**English**					
21UENG11	Communicative English -I	6	3	25	75	100
Part - III	**Core Courses**					
21UCAC11	Programming in C	5	5	25	75	100
21UCACP1	Programming in C Lab	4	4	40	60	100
Part III	**Allied Course**					
21UMCA11	Mathematical Foundations	**5**	4	25	75	100
Part IV	**Skill Based Course**					
21UCASP1	MULTIMEDIA LAB	2	2	40	60	100
Part IV	**Mandatory Course**					
21UEVG11	Environmental Studies	2	2	25	75	100
	Total	**30**	**23**	**205**	**495**	**700**
SECOND SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG21	**இடைக்கால இலக்கியமும் சிறுகதையும்**	6	3	25	75	100
Part – II	**English**					
21UENG21	Communicative English -II	6	3	25	75	100
Part - III	**Core Courses**					
21UCAC21	Data Structures using C++	5	5	25	75	100
21UCACP2	Data Structures using C++ Lab	4	4	40	60	100
Part III	**Allied Course**					
21UMCA21	Probability and Statistics	**5**	4	25	75	100
Part IV	**Skill Based Course**					
21UCASP2	PHP Lab	2	2	40	60	100
21UEVG21	**Value Education**	2	2	25	75	100
	Total	**30**	**23**	**205**	**495**	**700**

THIRD SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG31	காப்பிய இலக்கியமும் உரைநடையும்	6	3	25	75	100
Part – II	**English**					
21UENG31	Communicative English -III	6	3	25	75	100
Part - III	**Core Courses**					
21UCAC31	Java Programming	5	5	25	75	100
21UCACP3	Java Programming Lab	4	4	40	60	100
Part III	**Allied Course**					
21UCOA32	Principles of Accounting	5	4	25	75	100
Part IV	**Skill Based Course**					
21UCASP3	Python Lab	2	2	40	60	100
Part IV	**Non Major Elective Course**					
21UCAN31	HTML Programming	2	2	25	75	100
	Total	**30**	**23**	**205**	**495**	**700**
FOURTH SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG41	பண்டைய இலக்கியமும் புதினமும்	6	3	25	75	100
Part – II	**English**					
21UENG41	Communicative English -IV	6	3	25	75	100
Part - III	**Core Courses**					
21UCAC 41	Database Management System	5	4	25	75	100
21UCACP4	Database Management System Lab	4	4	40	60	100
Part III	**Allied Course**					
21UCOA42	Basics of Cost Accounting	5	4	25	75	100
Part IV	**Skill Based Course**					
21UCASP4	R Programming Lab	2	2	40	60	100
Part IV	**Non Major Elective Course**					
21UCAN41	Multimedia	2	2	25	75	100
Part V	**Extension Activities**					
21UEAG40 21UEAG49	NSS, NCC, YRC	-	1	40	60	100
	Total	**30**	**23**	**245**	**555**	**800**

FIFTH SEMESTER						
Part - III	**Core Courses**					
21UCAC51	Operating system	6	4	25	75	100
21UCAC52	Computer Networks	6	4	25	75	100
21UCACP5	Linux Lab	6	4	40	60	100
Part III	**Core Elective**					
21UCAE51	Data mining and Warehousing	5	5	25	75	100
21UCAE52	Software Project Management					
21UCAE53	Internet of Things					
	Core Elective II					
21UCAE54	Cloud computing	5	5	25	75	100
21UCAE55	Management Information Systems					
21UCAE56	Artificial Intelligence					
Part IV	**Skill Based Course**					
21UCASP5	Data mining Lab	2	2	40	60	100
	Total	**30**	**24**	**180**	**420**	**600**
SIXTH SEMESTER						
Part - III	**Core Courses**					
21UCAC61	C# and .Net Programming	6	4	25	75	100
21UCACP6	C# and .Net Programming Lab	6	4	40	60	100
21UCAPR1	Project and viva - voce	6	4	40	60	100
Part III	**Core Elective I**					
21UCAE61	Cyber Security	5	5	25	75	100
21UCAE62	Client server Computing					
21UCAE63	Mobile Computing					
	Core Elective II					
21UCAE64	Computer Graphics	5	5	25	75	100
21UCAE65	Software Testing					
21UCAE66	Big Data Analytics					
Part IV	**Skill Based Course**					
21UCASP6	Android Development Lab	2	2	40	60	100
	Total	**30**	**24**	**195**	**405**	**600**
	Grand Total	**180**	**140**	**1235**	**2865**	**4100**

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

Course Name	**PROGRAMMING IN C**			
Course Code	**21UCAC11**	**L**	**P**	**C**
Category	**Core**	5	-	5

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

Course Objectives:

- To learn computer programming using the C programming language
- To learn the basic programming constructs, so that they can easily switch over to any other language in future.
- To describe and employ strategies that are useful in debugging
- To develop logics which will help them to create programs and applications in C.
- To analyze programming problems to choose when regular loops should be used and when recursion will produce a better program.

Unit: I	**Overview of C**	15 Hours

History of C, Basic structure of C program, Executing a C Program Constant, Variables and Data types: C declarations, Keywords, identifiers, constants, variables, Data types, type conversion, Types of operators and expressions, Input and output functions in C

Unit: II	**Decision Making Statement**	15 Hours

IF-ELSE statement, break, continue, goto, switch () case and nested IF statement. Looping Statements: For loop, while loop, Do while loop and nested loops. Arrays: Definition, Initialization, characteristics, One, Two, Three and Multi-dimensional Arrays. Strings & String handling Functions

Unit: III	**Function**	15 Hours

Introduction, Need for User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, Functions that Return Multiple Values, Nesting of Functions, Recursion, Types of Storage Classes.

Unit: IV	**Structures and Union**	15 Hours

Introduction, defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, Copying and Comparing Structure variables, Operations on Individual Members, Unions, Bit Fields. Pointers – Introduction-Understanding Pointers, Accessing the Address of a Variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a Variable through its Pointer

Unit: V	**Files**	15 Hours

Introduction, Defining and Opening a File, Closing a File, Input / Output Operations on Files, Error Handling during I/O Operations, Random Access to Files, Command Line

	Total Lecture Hours	75

Books for study:

1. E. Balaguruswamy, Programming in ANSI C, TMH, New Delhi, 7th Edition, 2011.
   Unit I: Chapter 1– Section: 1.1, 1.2, 1.8, Chapter 2 – Section: 2.1 to 2.11, Chapter3 (Full), Chapter 4 (Full)
   Unit II: Chapter 5 (Full), Chapter 6(Full), Chapter 7(Full), Chapter 8 – Section: 8.1 to 8.4, 8.8.
   Unit III: Chapter 9 (Full)
   Unit IV: Chapter 10 (Full), Chapter 11– Section: 1.1 – 11.6.

Unit V: Chapter 12 (Full)
Books for Reference: **1.** Kannetkar Yashavant, Let us C, BPB, New Delhi, 6th Edition, 2005. **2.** Byron Gottfried, Programming with C, Schaum's Outlines, TMH, New Delhi, 2nd Edition, 2006.
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 Outcome		**K Level**
At the end of the course, the students will be able to		
CO1:	Able to understand the basic concepts used in computer programming and use different data types in a computer program	**K2**
CO2:	Able to develop, compile and debug programs in C language	**K3**
CO3:	Able to design programs involving decision structures, loops and functions.	**K3**
CO4:	Able to implementing pointers, structures and unions in C.	**K4**
CO5:	Able to apply file handling in C	**K3**

CO & PO Mappings:

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

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

LESSON PLAN

UNIT	PROGRAMMING IN C	Hrs	Mode
I	Overview of C: History of C, Basic structure of C program, Executing a C Program Constant, Variables and Data types: C declarations, Keywords, identifiers, constants, variables, Data types, type conversion, Types of operators and expressions, Input and output functions in C	15	Black Board/PPT
II	Decision Making Statement: IF-ELSE statement, break, continue, goto, switch() case and nested IF statement. Looping Statements: For loop, While loop , Do while loop and nested loops. Arrays: Definition, Initialization, characteristics, One, Two, Three and Multi-dimensional Arrays. Strings & String handling Functions	15	Black Board/PPT
III	Function: Introduction, Need for User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, Functions that Return Multiple Values, Nesting of Functions, Recursion, Types of Storage Classes.	15	Black Board/PPT
IV	Structures and Union: Introduction, defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, Copying and Comparing Structure Variables, Operations on Individual Members, Unions, Bit Fields. Pointers – Introduction-Understanding Pointers, Accessing the Address of a Variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a Variable through its Pointer	15	Black Board/PPT
V	Files: Introduction, Defining and Opening a File, Closing a File, Input/Output Operations on Files, Error Handling during I/O Operations, Random Access to Files, Command Line	15	Black Board/PPT

Course Designed by**: Mr.M.Ramesh Kumar & R.Ganapathy Subramanian**

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**	**K3**	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	**K3**	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	**CO3**	**K3**	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	**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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	**K1**	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	K5	-	-	-	-	-	-	-
	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	CO1	**K2**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K2)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
4	CO4	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K4&K4)**	**1(K4)**
5	CO5	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
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	4	10	-	19	15.83	**41**
K2	5	6	10	10	31	25.83	
K3	-	-	20	30	50	41.67	**42**
K4	-	-	10	10	20	16.67	**17**
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	K1	
12	CO2	K1	
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	K2	
16) b	CO1	K2	
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	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	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K3	

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

Course Name	**PROGRAMMING IN C LAB**			
Course Code	**21UCACP1**	**L**	**P**	**C**
Category	**Core Lab**	**-**	**4**	**4**
Nature of course:	**EMPLOYABILITY** ✓	**SKILL ORIENTED** ✓	ENTREPRENEURSHIP	

Course Objectives:

- To learn computer programming using the C programming language
- To learn the basic programming constructs, so that they can easily switch over to any other language in future.
- To describe and employ strategies that are useful in debugging
- To develop logics this will help them to create programs, applications in C.
- To analyze programming problems to choose when regular loops should be used and when recursion will produce a better program.

Sl.No	List of Programs	Hrs.
1	To find square root of nos. without using built in function.	60
2	To reverse digits of a number.	
3	To reverse the given string.	
4	To check if a number is Prime or not.	
5	To exchange the values of two variables using function.	
6	To find a Solution of a Quadratic Equation.	
7	To find a Sum of Series (sine, cosine).	
8	To find Ascending and descending order of numbers using Arrays (Use it to find Largest and Smallest Number).	
9	To find Sorting of names in Alphabetical order.	
10	Matrix operations (Addition, Subtraction, Multiplication, Transpose using functions).	
11	Finding factorials using recursive functions.	
12	Generating Fibonacci Numbers using recursive functions.	
13	String manipulations without using string functions (string Length, string comparison, string copy, palindrome checking, counting words and lines in strings).	
14	Prepare an address book using Structure.	
15	To add two numbers using pointer.	
16	To illustrate the use of bitwise operators.	
17	To demonstrate the use of command line arguments.	

18	To read character from one text file and convert into upper case and write in another file.	
19	To prepare student mark sheet using file.	
20	To prepare payroll system using file.	

Web Resources:
https://www.youtube.com/watch?v=Ln-L9IjQK_k
https://www.slideserve.com/svea/lab-1-introduction-to-c-programming

COURSE OUTCOME		**K Level**
At the end of the course, the student will be able to		
CO1:	Defining compiling and debugging of programs in C language	**K1**
CO2:	Executing and Implementing programs that use calculations and selections.	**K3**
CO3:	Executing and Implementing programs that use arrays and character strings and that use functions for character strings	**K3**
CO4:	Executing and Implementing programs that use functions, pointers, structures and unions in C	**K3**
CO5:	Executing and Implementing programs using file handling in C.	**K3**

CO & PO Mapping:

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

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

Lesson Plan

Sl.No	List of Programs	Hrs.	Mode
1	To find square root of nos. without using built in function.	60	Demo & PPT
2	To reverse digits of a number.		
3	To reverse the given string.		
4	To check if a number is Prime or not.		
5	To exchange the values of two variables using function.		
6	To find a Solution of a Quadratic Equation.		
7	To find a Sum of Series (sine, cosine).		
8	To find Ascending and descending order of numbers using Arrays (Use it to find Largest and Smallest Number).		
9	To find Sorting of names in Alphabetical order.		
10	Matrix operations (Addition, Subtraction, Multiplication, Transpose using functions).		
11	Finding factorials using recursive functions.		
12	Generating Fibonacci Numbers using recursive functions.		
13	String manipulations without using string functions (string Length, string comparison, string copy, palindrome checking, counting words and lines in strings).		
14	Prepare an address book using Structure.		
15	To add two numbers using pointer.		
16	To illustrate the use of bitwise operators.		
17	To demonstrate the use of command line arguments.		
18	To read character from one text file and convert into upper case and write in another file.		
19	To prepare student mark sheet using file.		
20	To prepare payroll system using file.		

Course Designed by**: Mr.M.Ramesh Kumar & R. Ganapathy Subramanian**

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

Course Name	**Mathematical Foundations**							
Course Code	**21UMCA11**					**L**	**P**	**C**
Category	**Allied**					5	-	4
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENEURSHIP**			✓

Course Objectives:

- To understand the rank of a matrix and apply it to solving system of linear equations.
- To analyze Eigen values and associated Eigen vectors of a matrix.
- To study the methods of reasoning, which includes algebra of propositions, such as compound propositions, truth tables, and tautologies
- To write and interpret mathematical notation and mathematical definitions
- To acquire a basic idea of graph, various terms associated and matrix representations of graphs, Trees and their properties

Unit: I	**Matrix Algebra**	15

Introduction - Matrix operations – Inverse of a Square Matrix – Elementary operations and Rank of a Matrix – Simultaneous Linear Equations.

Unit: II	**Matrix Algebra**	15

Inverse by Partitioning – Eigen values and Eigen vectors(Problems only)

Unit: III	**Logic**	15

Introduction – TF-statements – Connectives – Atomic and compound statements – Well Formed (Statement) Formulae – Truth table of a Formula – Tautology – Tautological Implications and Equivalence of Formulae

Unit: IV	**Lattices and Boolean Algebra**	15

Lattices – Some properties of Lattices – New Lattices – Modular and Distributive Lattices – Boolean Algebras – Boolean Polynomials – Karnaugh Graphs (Problems only).

Unit: V	**Graph Theory**	15

Basic concepts – Matrix Representation of Graphs – Trees – Spanning Trees – Shortest Path Problem (Problems only).

	Total Lecture Hours	**75 Hrs**

Books for Study:

Dr. M.K. Venkataraman. N. Sridharan. and N. Chandrasekaran.., **"Discrete Mathematics"**, The National Publishing Company, Chennai, 2006.

Unit I - Chapter 6: Pages : 6.1- 6.31
Unit II - Chapter 6: Pages : 6.31- 6.44
Unit III - Chapter 9: Pages : 9.1 – 9.34
Unit IV - Chapter10: Pages :10.1 – 10.70
Unit V - Chapter11: Pages : 11.1 – 11.81

Books for References:

1. Trembley. J.P. and Manohar.R., 2001, **Discrete Mathematical Structures with Applications to Compute Science**, Tata McGraw –Hill Publishing Company Ltd, New Delhi.
2. Seymour Lipschutz and Marc Lars Lipson, 2002, **Discrete Mathematics**, Tata McGraw Hill

Publishing Company Ltd. New Delhi.	
Web Resources:	
• https://nptel.ac.in/courses/106/106/106106094/ • https://nptel.ac.in/courses/111/107/111107058/ • https://nptel.ac.in/courses/111/106/111106086/ • https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-cs53/	
Course Outcomes	**K Level**
On the successful completion of the course, the students will be able to	
CO1: apply the matrix theory to study other branches of mathematics like algebra, vector analysis, cryptography, graph theory etc	**K1**
CO2: apply the matrix theory to analyze the quantitative and qualitative properties of solutions of mathematical models in biological, ecological systems and in engineering problems	**K1**
CO3: be conversant with the rules of logic to understand and reason with statements	**K3**
CO4: Formulate and interpret Boolean logic principles.	**K3**
CO5: have a strong background of graph theory	**K3**

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	COURSE NAME	Hrs	Mode
I	Introduction - Matrix operations – Inverse of a Square Matrix – Elementary operations and Rank of a Matrix – Simultaneous Linear Equations.	12	Chalk & Talk, LCD Projector
II	Inverse by Partitioning – Eigen values and Eigen vectors (Problems only)	12	Chalk & Talk
III	Introduction – TF-statements – Connectives – Atomic and compound statements – Well Formed (Statement) Formulae – Truth table of a Formula – Tautology – Tautological Implications and Equivalence of Formulae	12	Chalk & Talk
IV	Lattices – Some properties of Lattices – New Lattices – Modular and Distributive Lattices – Boolean Algebras – Boolean Polynomials – Karnaugh Graphs (Problems only).	12	Chalk & Talk, LCD Projector
V	Basic concepts – Matrix Representation of Graphs – Trees – Spanning Trees – Shortest Path Problem (Problems only).	12	Chalk & Talk, Assignment

Course Designed by: **Mr. P. Palanikumar& Dr. S. Suriyakala**

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**	Up to K3	2	K1,K2	1	K1	2 (K2)	1 K3
	CO2	Up to K4	2	K1,K2	2	K2	2(K3&K3)	1 (K4)
CI AII	**CO3**	Up to K4	2	K1,K2	1	K1	2 (K2)	1 (K3)
	CO4	Up to K4	2	K1,K2	2	K2	2 (K3)	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	40
	K2	2	4	10	-	16	32	
	K3	-	-	10	10	10	20	40
	K4	-	-	-	10	10	10	20
	K5	-	-	-	--	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	**K1**	2	2	-	-	4	8	40
	K2	2	4	10	-	16	32	
	K3	-	-	10	10	10	20	40
	K4	-	-	-	10	10	10	20
	K5	-	-	-	--	-	-	-
	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	K3	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	K1	
2	CO1	K1	
3	CO2	K1	
4	CO2	K1	
5	CO3	K3	
6	CO3	K3	
7	CO4	K3	
8	CO4	K3	
9	CO5	K3	
10	CO5	K3	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
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	K1	
16) b	CO1	K1	
17) a	CO2	K1	
17) b	CO2	K1	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
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	K1	
22	CO2	K1	
23	CO3	K3	
24	CO4	K3	
25	CO5	K3	

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

Course Name	**INTERNET BASICS LAB**			
Course Code	**21UITSP1**	**L**	**P**	**C**
Category	**Skill Lab**	-	2	2

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

Course Objectives:

- To provide complete knowledge of Internet basics
- To learn the concept of static web page .
- To know the usage of Markup languages with scripting.
- To understand the working principle behind the website.
- To learn the concepts of chatting and network components in future.

S. No.	List of Programs	Hours
1.	Describe the stages of create e-mail id on yahoo web site, how will you send and receive e mail.	
2.	Describe the chatting components on the internet	
3.	Describe the use and function of the following (a) telnet (b) TCP/IP (c) HTTP.	
4.	Create your first web page using notepad in HTML.	
5.	Create your login webpage for your college website or company website.	
6.	Create the web page with the following constraints a) an image on the webpage. b) a hyperlink to college website c) a table of marks of IT class students.	30
7.	Show blinking effect on web page using java script.	
8.	Design a digital clock on your web page using java script.	
9.	Design a digital calculator using HTML and java Script.	
10.	Design the web site on your college	
	Total Lecture Hours	**30**

Course Outcomes :		**K Level**
At the end of the Course the student will be able to		
CO1:	Understand, create email id, sending and receiving emails.	**K3**
CO2:	Apply and design Web Page using HTML and Java script.	**K2**
CO3:	Familiarize with Web page design using HTML / DHTML.	**K3**
CO4:	Create a Web site using text, images, links, lists.	**K4**
CO5:	Demonstrate simple applications programs using HTML controls	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

S. No.	List of Programs	Hours	Mode
1.	Describe the stages of create e-mail id on yahoo web site, how will you send and receive e mail.	30	**Laboratory Experiments**
2.	Describe the chatting components on the internet		
3.	Describe the use and function of the following (a) telnet (b) TCP/IP (c) HTTP.		
4.	Create your first web page using notepad in HTML.		
5.	Create your login webpage for your college website or company website.		
6.	Create the web page with the following constraints a) an image on the webpage. b) a hyperlink to college website		
7.	c) a table of marks of IT class students.		
8.	Show blinking effect on web page using java script.		
9.	Design a digital clock on your web page using java script.		
10.	Design a digital calculator using HTML and java Script.		
	Design the web site on your college		

Course Designed by**: Ms. T. Thivya Sindhu & Mrs. R.K. Vijayalakshmi**


SECOND SEMESTER

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

Course Name	**OBJECT ORIENTED PROGRAMMING WITH- C++**			
Course Code	**21UITC21**	**L**	**P**	**C**
Category	**Core**	5	-	5

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

Course Objectives:

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To implement the object oriented Paradigm.

Unit: I	**Principles of OOP :**	15

Object Oriented Programming Paradigm- Basic concepts of OOP-Benefits of OOP. Beginning with C++: What is C++ - A simple C++ program-Structure of C++ Program -Tokens-Keywords-Identifiers and Constants-Basic data types-User defined data types – Derived data types-storage classes- type compatibility-Declaration of variables-Scope resolution operator- manipulator-Expression and their types-Control structures.

Unit: II	**Functions in C++:**	15

The Main function-function prototyping-Call by reference-return by reference-Inline functions-Recursion- Function Overloading- Default Arguments-Function Overloading. Class and Objects: Introduction-specifying a Class-Defining member function-Nesting of member function- Arrays within a class-Memory allocation for objects-Static data members and member functions-Array of objects-Friendly functions-returning objects-const member functions.

Unit: III	**Constructors and Destructors:**	15

Introduction-Constructors- Parameterized constructor-Constructor with default arguments-Dynamic initialization of objects-Copy constructor-Dynamic constructor-constructing two dimensional arrays-Destructor. Operator Overloading: Defining operator overloading-Overloading unary operators-Overloading binary operators- Rules for overloading operators. Inheritance: Introduction-Single-Multilevel-Multiple-Hierarchical-Hybrid inheritance-virtual base class

Unit: IV	**Templates:**	15

Introduction-Class templates-Class template with multiple parameters-function templates-function template with multiple parameters –overloading of template functions-member function template-non-type template arguments. Exception Handling: Introduction - basics of exception handling-exception handling mechanism-catching mechanism-rethrowing an exception. Manipulating strings: Introduction (string) objects-manipulating string objects-relational operations-comparing and swapping.

Unit: V	**I/O Operations:**	15

Managing console I/O operations: Introduction-C++ streams- C++ stream classes-unformatted I/O operations-formatted console I/O operations-output manipulators. Working with files: Introduction: classes for file stream operations-opening and closing a file-detecting EOF() - file modes-sequential i/o operations-random access-command line arguments.

	Total Lecture Hours	75

Books for study:

1. E.Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education (Private) Limited, 6th Edition New Delhi, 2014. Unit 1: Chapter 1,2 & 3 Unit 2: Chapter 3 & 4 Unit 3: Chapter 5,6 & 7 Unit 4: Chapter 12,13 & 14 Unit 5: Chapter 10 & 11
Books for References:
1. Stroustrup, The C++ Programming Language, 4th Edition. AddisionWesley . May 2013. **2.** Herbert Schildt C++ - The Complete Reference ,4th Edition, McGraw Hill. July 2017
Web Resources:
1. http://www.lmpt.univ-tours.fr/~volkov/C++.pdf **2. https://www.tutorialspoint.com/cplusplus/cpp_tutorial.pdf**

Course Outcomes:		**K Level**
At the end of the Course the student will be able to		
CO1:	Define various data types, use them in simple data processing applications, object oriented concepts for solving scientific and mathematical problems.	**K3**
CO2:	Understand of object oriented programming concepts in real time problems.	**K3**
CO3:	Implement the concept of overloading, inheritance, exception handling.	**K3**
CO4:	Find the advantages of OOPs over Procedural Languages	**K4**
CO5:	Develop Application of C++ program skills in real time project and develop confidence to update the C++ language for life time.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	Object Oriented Programming- C++	Hrs	Pedagogy
I	Principles of OOP : Object Oriented Programming Paradigm- Basic concepts of OOP-Benefits of OOP. Beginning with C++: What is C++ - A simple C++ program-Structure of C++ Program -Tokens-Keywords-Identifiers and Constants-Basic data types-User defined data types – Derived data types-storage classes- type compatibility-Declaration of variables-Scope resolution operator- manipulator-Expression and their types-Control structures.	15	Chalk & Talk, ICT Kit
II	Functions in C++: The Main function-function prototyping-Call by reference-return by reference-Inline functions-Recursion- Function Overloading- Default Arguments-Function Overloading. Class and Objects: Introduction-specifying a Class-Defining member function-Nesting of member function- Arrays within a class-Memory allocation for objects-Static data members and member functions-Array of objects-Friendly functions-returning objects-const member functions.	15	Chalk & Talk, ICT Kit
III	Constructors and Destructors: Introduction-Constructors- Parameterized constructor-Constructor with default arguments-Dynamic initialization of objects-Copy constructor-Dynamic constructor-constructing two dimensional arrays-Destructor. Operator Overloading: Defining operator overloading-Overloading unary operators-Overloading binary operators-Rules for overloading operators. Inheritance: Introduction-Single-Multilevel-Multiple-Hierarchical-Hybrid inheritance-virtual base class	15	Chalk & Talk, ICT Kit
IV	Templates: Introduction-Class templates-Class template with multiple parameters-function templates-function template with multiple parameters –overloading of template functions-member function template-non-type template arguments. Exception Handling: Introduction - basics of exception handling- exception handling mechanism-catching mechanism-rethrowing an exception. Manipulating strings: Introduction (string) objects-manipulating string objects-relational operations-comparing and swapping.	15	Chalk & Talk, ICT Kit
V	Managing console I/O operations: Introduction-C++ streams- C++ stream classes-unformatted I/O operations-formatted console I/O operations-output manipulators. Working with files: Introduction: classes for file stream operations-opening and closing a file-detecting EOF() - file modes-sequential i/o operations-random access-command line arguments.	15	Chalk & Talk, ICT Kit

Course Designed by: **Mrs.R.Vanitha & Mr.P.Ganeshbabu**

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CIA II	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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**	**10**	**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	CO1	K3	2	K1&K2	1	K1	2 (K3& K3)	1 (K3)
2	CO2	K3	2	K1&K2	1	K1	2 (K3 &K3)	1 (K3)
3	CO3	K3	2	K1&K2	1	K2	2 (K3 &K3)	1 (K3)
4	CO4	K4	2	K1&K2	1	K2	2 (K4 &K4)	1 (K4)
5	CO5	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 Levels	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

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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**OBJECT ORIENTED PROGRAMMING WITH C++ LAB**			
Course Code	**21UITCP2**	**L**	**P**	**C**
Category	**Core Lab**	-	4	4

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

Course Objectives:

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To implement the concept of OOPs.

S. No.	List of Programs	Hours
1.	Conversion of Fahrenheit and Celsius using class.	
2.	Calculate multiplication and division using inline function.	
3.	Perform area calculation the function overloading	
4.	Print the employee details using Arrays of object.	
5.	Swapping of two numbers using friend function.	
6.	Change the sign using overloading unary minus	
7.	Overload binary + operator this adds two complex numbers.	
8.	Calculate BMI using single inheritance	
9.	Generate salary bill using multiple inheritance.	
10.	Calculate square and cube of a number using hierarchical inheritance.	
11.	Process Student Mark list Multilevel inheritance.	**60**
12.	Print the Student Mark list using Virtual Base class.	
13.	Sort N numbers using Bubble Sort.	
14.	Search an element using Linear Search	
15.	Search an element using Binary Search.	
16.	Perform stack operations using Array.	
17.	Perform stack operations using Linked List.	
18.	Print Fibonacci series using Recursion.	
19.	Perform queue operations using Array.	
20.	Traversal of Tree	
	Total Lecture Hours	**60**

Course Outcomes		K Level
At the end of the Course the students will be able to		
CO1:	Understand the concept of class, member function and member variable.	**K2**
CO2:	Understand the difference between the top-down and bottom-up approach	**K3**
CO3:	Categorize the inheritance types and polymorphism	**K3**
CO4:	Apply and analyze Exception handling.	**K4**
CO5:	Test the templates concept of OOP.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

S. No.	List of Programs	Hrs	Pedagogy
1.	Conversion of Fahrenheit and Celsius using class.	**60**	**Laboratory Experiments**
2.	Calculate multiplication and division using inline function.		
3.	Perform area calculation the function overloading		
4.	Print the employee details using Arrays of object.		
5.	Swapping of two numbers using friend function.		
6.	Change the sign using overloading unary minus		
7.	Overload binary + operator this adds two complex numbers.		
8.	Calculate BMI using single inheritance		
9.	Generate salary bill using multiple inheritance.		
10.	Calculate square and cube of a number using hierarchical inheritance.		
11.	Process Student Mark list Multilevel inheritance.		
12.	Print the Student Mark list using Virtual Base class.		
13.	Sort N numbers using Bubble Sort.		
14.	Search an element using Linear Search		
15.	Search an element using Binary Search.		
16.	Perform stack operations using Array.		
17.	Perform stack operations using Linked List.		
18.	Print Fibonacci series using Recursion.		
19.	Perform queue operations using Array.		
20.	Traversal of Tree		

Course Designed by: **Mrs.R.Vanitha & Mr.P.Ganeshbabu**

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

Course Name	**DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION**			
Course Code	**21UELA21**	**L**	**P**	**C**
Category	**Allied**	5	-	4

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

Course Objectives:

- To understand the basics of number system and gates.
- To learn how to work on combinatorial Logic.
- To learn the Arithmetic Circuits and Flip-Flops.
- To learn the types of Registers.
- To implement the instruction codes.

Unit: I	**Number Systems and Codes:**	15

Binary Number system – Binary to decimal – decimal to binary – hexa decimal – ASCII code – Excess-3 Code – Gray code.
Digital Logic: The Basic Gates – NOT, OR, AND - Universal Logic Gates – NOR, NAND.

Unit: II	**Combinatorial Logic Circuits:**	15

Boolean Laws and Theorems. - Sum of Products method - Truth table to Karnaugh Map – Pairs, Quads, Octets – Don't Care Conditions- Product-of sums method -Product-of sums Simplifications.
Data Processing Circuits: Multiplexers – Demultiplexers-1-of-16 Decoder – BCD-to- decimal Decoders – Seven-segment Decoders – Encoders – Exclusive- OR Gates- Parity Generators and Checkers

Unit: III	**Arithmetic Circuits:**	15

Binary Addition- Binary Subtraction – 2'S Complement Representation - 2's Complement Arithmetic – Arithmetic Building Blocks- Adder- Subtractor
Flip-Flops-RS Flip-Flops-Gated Filp-Flops-Edge-triggered RS Flip-Flops-Edge-triggered D Flip-flops--Edge-triggered JK Flip-Flops-JK Master Slave Flip-flops.

Unit: IV	**Types of Registers**	15

Serial In-Serial Out – Serial In-Parallel Out – Parallel In- Parallel Out – Ring Counter – Ripple Counter – Synchronous Counter.

Unit: V	**Instruction Codes**	15

Computer Register – Computer Instructions – Timing And Control – Instruction Cycle. Control Memory – Address Sequencing – General Register Organization – Stack Organization – Instruction Formats – Data Transfer and Manipulations -Addressing Modes – Program Control.

	Total Lecture Hours	75

Books for Study:

1. Digital Principles and Applications – Donald P Leach, Albert Paul Malvino, Goutam Saha, 8th edition , McGraw-Hill Education, 3rd reprint 2015.
2. Computer System Architecture, M. Morris Mano, Pearson Education,3rd Edition- 2007
   UNIT I : Text Book 1 :Chapters 5: (5.1 to 5.9) and 2: (2.1 to 2.3)
   UNIT II : Text Book 1 :Chapters 3: (3.1 to 3.8) and 4: (4.1 to 4.7)

UNIT III : Text Book 1 :Chapters 6: (6.1 to 6.8) and 8: (8.1 to 8.5,8.8) UNIT IV : Text Book 1 :Chapters 9: (9.1 to 9.6) and 10: (10.1,10.3) UNIT V : Text Book 2 :Chapter 5:(5.1 to 5.5) ,7:(7.1,7.2) and Chapter 8 (8.1 to8.7)
Books for References:
1. Digital Design, R.Anantha Natarajan, PHI Learning, 2015. 2. Principles of Digital Electronics, K.Meena, PHI Learning, 2013. **3.** Digital Computer Fundamentals, Thomas C. Bartee TMH 2007.
Web Resources:
1. https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdf **2. https://www.javatpoint.com/digital-computers**

Course Outcomes		**K Level**
CO1:	Understand the basics of number system and logic gates	**K3**
CO2:	Understand combinatorial logic circuits and implementation of circuits	**K3**
CO3:	Analyze the concept of Arithmetic circuits and Flip Flops.	**K4**
CO4:	Relate the ideas of types of registers	**K3**
CO5:	Analyze the use of Instruction codes, Addressing modes and program controls	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	Digital Principles And Computer Organization	Hrs	Pedagogy
I	Binary Number system – Binary to decimal – decimal to binary – hexa decimal – ASCII code – Excess-3 Code – Gray code. **Digital Logic:** The Basic Gates – NOT, OR, AND - Universal Logic Gates – NOR, NAND.	**15**	Chalk & Talk, ICT Kit
II	Boolean Laws and Theorems. - Sum of Products method - Truth table to Karnaugh Map – Pairs, Quads, Octets – Don't Care Conditions- Product-of sums method -Product-of sums Simplifications. **Data Processing Circuits:** Multiplexers – Demultiplexers-1-of-16 Decoder – BCD-to- decimal Decoders – Seven-segment Decoders – Encoders – Exclusive- OR Gates- Parity Generators and Checkers	**15**	Chalk & Talk, ICT Kit
III	Binary Addition- Binary Subtraction – 2'S Complement Representation - 2's Complement Arithmetic – Arithmetic Building Blocks- Adder- Subtractor **Flip-Flops**-RS Flip-Flops-Gated Filp-Flops-Edge-triggered RS Flip-Flops-Edge- triggered D Flip-flops--Edge-triggered JK Flip-Flops-JK Master Slave Flip-flops.	**15**	Chalk & Talk, ICT Kit
IV	Serial In-Serial Out – Serial In-Parallel Out – Parallel In- Parallel Out – Ring Counter –Ripple Counter – Synchronous Counter.	**15**	Chalk & Talk, ICT Kit
V	Computer Register – Computer Instructions – Timing And Control – Instruction Cycle. Control Memory – Address Sequencing – General Register Organization – Stack Organization – Instruction Formats – Data Transfer and Manipulations -Addressing Modes – Program Control.	**15**	Chalk & Talk, ICT Kit

Course Designed by**: Mrs. R.K. Vijayalakshmi & Mrs. T. ThivyaSindhu**

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	K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
	CO2	K3	2	K1&K2	2	K2	2 (K3&K3)	1(K3)
CIA II	CO3	K4	2	K1&K2	2	K2	2 (K4&K4)	1(K4)
	CO4	K3	2	K1&K2	1	K3	2 K3&K3)	1(K3)
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	40
	K2	2	4	10		16	32	
	K3	-	-	10	10	20	40	40
	K4	-	-	-	10	10	20	20
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	2	-	-	4	8	40
	K2	2	4	10		16	32	
	K3	-	-	10	10	20	40	40
	K4	-	-	-	10	10	20	20
	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	CO1	K3	2	K1&K2	1	K1	2 (K3& K3)	1 (K3)
2	CO2	K3	2	K1&K2	1	K1	2 (K3&K3)	1 (K3)
3	CO3	K4	2	K1&K2	1	K2	2 (K4&K4)	1 (K4)
4	CO4	K3	2	K1&K2	1	K2	2 (K3&K3)	1 (K3)
5	CO5	K4	2	K1&K2	1	K2	2 (K3&K3)	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 Levels	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		-	11	9.17	33.34
K2	5	4	10	10	29	24.17	
K3	-	-	30	30	60	50	50
K4	-	-	10	10	20	16.67	16 .66
Marks	10	10	50	50	120	100	100

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	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	
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	K3	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER APPLICATIONS
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Course Name	**PC SOFTWARE LAB**			
Course Code	**21UITSP2**	**L**	**P**	**C**
Category	**Skilled Lab**	-	2	2

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

Course Objectives:

- To Bring the creativity and enhance the learners in desktop applications
- To know the techniques and application of the said.
- To experiment themselves in the application.
- To apply the concepts of the tools used.
- To think, create, design, develop and implement office tools with a good aesthetic sense of designing.

S. No.	List of Programs	Hours
1.	Create and manage files and folder tree	**30**
2.	Use accessories utilities of windows OS	
3.	Entering and editing text in document file.	
4.	Apply formatting features on text like bold, italics, underline, font type, color and size. Apply features like bullet, numbering	
5.	Create documents, insert images, format tables	
6.	Create and manipulate tables	
7.	Entering and editing data in worksheet	
8.	Apply formula and functions in the sheet	
9.	Use graphics and auto shapes in excel sheet	
10.	Create and manipulate excel charts	
11.	Create pay bills, pay slips, electricity bills using excel	
12.	Print sheet using print area	
13.	Basic operations of power point, create ppt and inset and delete slides	
14.	Create project presentations, lecture presentations.	
15.	Use of mater slide in presentation	
16.	Apply basic formatting features in presentation like font, font size, font colour, text fill, spacing and line spacing formatting text boxes, word arts, styles bullet and numbering	
17.	Working with drawing tools, applying shape or picture styles, applying object borders, object fill, object effects.	
18.	Working with video, link to video and sound files.	
19.	Creating hyperlinks, using action buttons.	
20.	Procedure to type a word and apply the effects shadow emboss	
	Total Lecture Hours	**30**

Course Outcomes		**K Level**
At the end of he Course the students will be able to		
CO1:	Understand the concept of files and folders in a system.	**K3**
CO2:	Execute the usage of word document and its properties.	**K3**
CO3:	Execute the usage of Excel worksheet and its properties.	**K3**

CO4:	Understand the basics of PowerPoint.	**K3**
CO5:	Execute the tools in PowerPoint.	**K3**

CO & PO Mapping:

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

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

LESSON PLAN

S. No.	List of Programs	Hrs	Mode
1.	Create and manage files and folder tree	30	Laboratory Experiments
2.	Use accessories utilities of windows OS		
3.	Entering and editing text in document file.		
4.	Apply formatting features on text like bold, italics, underline, font type,color and size. Apply features like bullet, numbering		
5.	Create documents, insert images, format tables		
6.	Create and manipulate tables		
7.	Entering and editing data in worksheet		
8.	Apply formula and functions in the sheet		
9.	Use graphics and auto shapes in excel sheet		
10.	Create and manipulate excel charts		
11.	Create pay bills, pay slips, electricity bills using excel		
12.	Print sheet using print area		
13.	Basic operations of power point, create ppt and inset and delete slides		
14.	Create project presentations, lecture presentations.		
15.	Use of mater slide in presentation		
16.	Apply basic formatting features in presentation like font, font size, font colour, text fill, spacing and line spacing formatting text boxes, word arts, styles bullet and numbering		
17.	Working with drawing tools, applying shape or picture styles, applying object borders, object fill, object effects.		
18.	Working with video, link to video and sound files.		
19.	Creating hyperlinks, using action buttons.		
20.	Procedure to type a word and apply the effects shadow emboss		

Course Designed by: **Mr. P. Ganesh Babu & Dr. M. Karthika**


THIRD SEMESTER

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

Course Name	**JAVA PROGRAMMING**							
Course Code	**21UCAC31**					**L**	**P**	**C**
Category	**Core**					5	-	5
Nature of Course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP			

COURSE OBJECTIVES:

- Discover knowledge about basic java language syntax and semantics to write java programs and use concepts such as variables, data types, etc.
- Demonstrate the fundamentals of object-oriented programming concepts, including objects, invoking methods, etc.
- Analyze the concepts of strings and arrays.
- Develop Java program using packages and interface.
- Assess the design controls using applets and AWT controls.

Unit: I	**Foundations of Java**	**15 hrs**

Computer systems – Programming languages – Stage for Java – Origin of Java – Challenges of Java – Java features – Java program development – Object-oriented programming. **Java Essentials:** Elements of Java program – Java API – Variables and literals – Primitive data types – The string class – Operators – Constants.

Unit: II	**Control Statement**	**15 hrs**

The if statement – The if-else statement – Nested if statements – The if-else-if statement – Logical operators – Comparing string objects – The conditional operator – The switch statement – Increment and decrement operators – while loop – Do-while loop – For loop – nested loops – Break and continue statements. **Classes and Objects:** Classes and objects – Modifiers – Passing arguments – Constructors – Packages and import statements – Finding the classes and their responsibilities – Static class members – Overloaded methods – Overloaded Constructors – Returning objects from method – The toString method – Writing an equals method – This reference variable – Enumerated types – Garbage collection.

Unit: III	**Arrays**	**15 hrs**

Introduction to array – Processing array contents – Passing array as arguments to methods – Array algorithms and operations – Returning array from methods – String array – Array of objects – Two-dimensional array – Array with three or more dimensions. **String Handling:** String class – String concatenation – Comparing strings – Substring – String class methods – Other String class methods. **Inheritance:** Basics of inheritance – Inheriting and overriding superclass methods – Calling superclass constructor – Polymorphism – Classes that inherit from different classes – Abstract classes – Final class.

Unit: IV	**Interface and Package**	**15 hrs**

Basics of interface – Multiple interfaces – Multiple inheritance using interface – Multilevel interface – Packages. **Exception Handling:** Introduction – Try and catch block – Multiple catch blocks – Nested try – Finally block – The throw statement – Exception propagation – Throws clause – Custom exception – Built-in exceptions. **Multithreading:** Introduction – Threads in Java – Thread creation – Lifecycle of a thread – Joining a thread – Thread scheduler – Thread priority – Thread synchronization.

Unit: V	**File and I/O Streams**	**15 hrs**

The file class – Streams – The byte streams – Filtered byte streams – The random access file

class – The character streams. **Applets:** Applet fundamentals – Applet class – Applet life cycle – Steps for developing an applet program – Passing values through parameters – Graphics in an applet – Event-handling.

	Total Lecture Hours	**75**

Books for Study:

Java Programming for core and advanced learners By Sagayaraj, Denis, Karthik and Gajalakshmi, Universities Press, 2018.

Unit I	Chapter1:1.1 to 1.8	Chapter2: 2.1 to 2.6, 2.9
Unit II	Chapter3:3.1 to 3.14	
	Chapter4:4.1 to 4.15	
UnitIII	Chapter5: 5.1 to 5.9	
	Chapter6: 6.1 to 6.6	
	Chapter7: 7.1 to 7.7	
UnitIV	Chapter8:8.1 to 8.5	
	Chapter9:9.1 to 9.10	
	Chapter10: 10.1 to 10.8	
UnitV	Chapter11: 11.1 to 11.6	
	Chapter12: 12.1 to 12.7	

Books for References:

1. Programming with Java A primer By E.Balagurusamy, Tata Mcgraw Hill Education pvt Ltd New Delhi, 4th Edition, 2010.
2. Java: The Complete Reference, by Herbert schildt, Tata McGraw hill Education india, Seventh Edition, 2006.
3. Programming with java by C Muthu, Vijay Nicole india, Second Edition, 2008.

Web Resources:

1. **https://www.tutorialspoint.com/java/index.htm**
2. **https://www.javatpoint.com/java-tutorial**
3. **https://www.w3schools.com/java/**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1	Examine classes, Objects, Members of a class and relationships among them needed for a specific problem.	**K3**
CO2	Integrate Java programs using OOP principles and proper program structure	**K3**
CO3	Determine the concepts of Polymorphism, inheritance, Packages and Interface in java.	**K3**
CO4	Explaining exception handling, multithreaded applications with synchronization	**K4**
CO5:	Illustrate Java programs using AWT controls and applets for web applications.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	JAVA PROGRAMMING	Hrs	Pedagogy
I	**Foundations of Java:** Computer systems – Programming languages – Stage for Java – Origin of Java – Challenges of Java – Java features – Java program development – Object-oriented programming. **Java Essentials:** Elements of Java program – Java API – Variables and literals – Primitive data types – The string class – Operators – Constants.	15 Hrs	Chalk & Talk, ICT Kit
II	**Control Statements:** The if statement – The if-else statement – Nested if statements – The if-else-if statement – Logical operators – Comparing string objects – The conditional operator – The switch statement – Increment and decrement operators – while loop – Do-while loop – For loop – nested loops – Break and continue statements. **Classes and Objects:** Classes and objects – Modifiers – Passing arguments – Constructors – Packages and import statements – Finding the classes and their responsibilities – Static class members – Overloaded methods – Overloaded Constructors – Returning objects from method – The toString method – Writing an equals method – This reference variable – Enumerated types – Garbage collection.	15 Hrs	Chalk & Talk, ICT Kit
III	**Arrays:** Introduction to array – Processing array contents – Passing array as arguments to methods – Array algorithms and operations – Returning array from methods – String array – Array of objects – Two-dimensional array – Array with three or more dimensions. **String Handling:** String class – String concatenation – Comparing strings – Substring – String class methods – Other String class methods. **Inheritance:** Basics of inheritance – Inheriting and overriding superclass methods – Calling superclass constructor – Polymorphism – Classes that inherit from different classes – Abstract classes – Final class.	15 Hrs	Chalk & Talk, ICT Kit
IV	**Interface and Package:** Basics of interface – Multiple interfaces – Multiple inheritance using interface – Multilevel interface – Packages. **Exception Handling:** Introduction – Try and catch block – Multiple catch blocks – Nested try – Finally block – The throw statement – Exception propagation – Throws clause – Custom exception – Built-in exceptions. **Multithreading:** Introduction – Threads in Java – Thread creation – Lifecycle of a thread – Joining a thread – Thread scheduler –	15 Hrs	Chalk & Talk, ICT Kit

	Thread priority – Thread synchronization.		
V	**File and I/O Streams:** The file class – Streams – The byte streams – Filtered byte streams – The random-access file class – The character streams. **Applets:** Applet fundamentals – Applet class – Applet life cycle – Steps for developing an applet program – Passing values through parameters – Graphics in an applet – Event-handling.	**15 Hrs**	**Chalk & Talk, ICT Kit**

Course Designed by: Mrs. M. Muthulakshmi & Mr. M. Ramesh Kumar Assistant Professor

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**	**K3**	2	K1,K2	1	K1	2(K3,K3)	1(K3)
	CO2	**K3**	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	**CO3**	**K3**	2	K1,K2	1	K1	2(K3,K3)	1(K3)
	CO4	**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	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	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
	K5	-	-	-	-	-	-	-
	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 Questions**	**K – Level**		
1	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,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		-	-	5	4	16
K2	5	10	-	-	15	12	
K3	-	-	30	30	60	50	50
K4	-	-	20	20	40	34	34
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**JAVA Programming Lab**			
Course Code	**21UCACP3**	**L**	**P**	**C**
Category	**Core Lab**	-	4	4

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

Course Objectives:

- Build programming skills using java for real world requests.
- Implement constructors, interfaces and overloading concepts
- Implement standard problems using java programming.
- Design and develop the concept of inheritance and its types.
- Generate java programs using applets.

1 **2** **3**	Simple Programs without classes and objects, methods Program based on the concepts of classes and objects Constructor and Parameterized constructor	**12 Hrs**
4 **5** **6**	Method overloading Constructor overloading Single level & Multi level inheritance	**12 Hrs**
7 **8** **9**	Abstract Classes, Interface Arrays Exception Handling	**12 Hrs**
10 **11**	Package Multithreading	**12 Hrs**
12 **13**	Applet I/O Handling and File Handling	**12 Hrs**
	Total Lecture Hours	**60**

Web Resources

1.https://www.javatpoint.com/java-programs
2. https://javatutoring.com/java-programs/
3. https://www.programiz.com/java-programming/examples

Course Outcomes		**K Level**
At the end of the course the students will be able to		
CO1:	Relate software development skills using java programming for real world applications.	**K2**
CO2:	Implement Packages, interfaces and inheritance concepts	**K3**
CO3:	Determine classical problems using java programming.	**K3**
CO4:	Analyse, Design and develop the concept of Multithreading	**K4**
CO5:	Examine java programs using AWT controls	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

	List of Programs	Hrs	Pedagogy
1 2 3	Simple Programs without classes and objects, methods Program based on the concepts of classes and objects Constructor and Parameterized constructor	60	Black Board, Lab Demonstration and LCD Projector.
4 5 6	Method overloading Constructor overloading Single level & Multi level inheritance		
7 8 9	Abstract Classes, Interface Arrays Exception Handling		
10 11	Package Multithreading		
12 13	Applet I/O Handling and File Handling		

Course Designed by: Mrs. M. Muthulakshmi & Mr. M. Ramesh Kumar Assistant Professor

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

Course Name	**PRINCIPLES OF ACCOUNTING**					
Course Code	**21UCOA32**			**L**	**P**	**C**
Category	**ALLIED**			5	-	4
Nature of course:	**EMPLOYABILITY**	✓	SKILL ORIENTED	ENTREPRENEURSHIP		

Course Objectives:

1. To understand the basic concepts and convention of accounting, accounting system.
2. To know how the accounting entries are posted in books.
3.To familiarize the learner to prepare the financial statement
4. To train the learners to prepare the accounts of trading and non- trading concerns
5. To gain knowledge on the depreciation methods

UNIT: I	**INTRODUCTION**	**15 Hours**

Meaning and definition of Book keeping and accounting – Functions of accounting – Objectives of accounting – Advantages & limitation of accounting – Double entry system of book keeping – Advantages of double entry system – Difference between single entry system and double entry system.

UNIT: II	**JOURNAL**	**15 Hours**

Meaning - Definition - Advantages of Journal- Golden rules of Accounting– Types of accounts – Passing of Journal Entries

UNIT: III	**LEDGER**	**15 Hours**

Meaning – Advantages – Difference between Journal and ledger – Balancing of accounts in the ledger – Practical exercises for the preparation of ledger.

UNIT: IV	**TRIAL BALANCE**	**15 Hours**

Meaning – Objectives – Distinction between Trial balance and Balance sheet - Preparation of Trial Balance

UNIT: V	**FINAL ACCOUNTS**	**15 Hours**

Meaning of Final accounts – Objectives — Format of trading, profit and loss account and balance sheet. Simple adjustments in final accounts (outstanding, prepaid, depreciation) – Practical problems

	Total Lecture Hours	75 Hours

(80% of marks must be allotted to problem solving questions. 20% of marks must be allotted to Theory questions).

Question must be asked 80% on Problem 20 % on Theory

Books for Study:

1. T.S.Grewal, "Double Entry Book-Keeping", Sultan Chand & Sons, New Delhi, reprint2002.

Books for References:

1. T.S.Reddy and A.Murthy, "Financial Accounting", Margham Publications, 6th Edition, Reprint 2014.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc19_mg37/preview

2. https://www.youtube.com/watch?v=P9JIBbZas3w 3. https://onlinecourses.swayam2.ac.in/cec20_mg23/preview		
Course Outcomes		**K Level**
CO1:	To understand the basic Accounting concepts.	**Up to K2**
CO2:	To apply the kinds of cash book.	**Up to K2**
CO3:	To apply the practice of final accounts.	**Up to K2**
CO4:	To solve the various methods of Depreciation.	**Up to K2**
CO5:	To identify the features of Non Trading Organization.	**Up to K2**

CO & PO Mappings:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	2	3	2
CO2	3	2	3	3	3	2
CO3	3	2	3	2	2	2
CO4	3	1	2	2	2	3
CO5	3	2	3	2	2	3

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

LESSON PLAN

UNIT	Basics of Accounting	Hrs	Pedagogy
I	**Book Keeping**	5	Chalk and Talk
II	**Subsidiary books**	5	Chalk and Talk
III	**Final Accounts**	7	Chalk and Talk
IV	**Depreciation**	6	Chalk and Talk
V	**Non trading Organization**	7	Chalk and Talk

Course Designed by:

Dr. N. Saraswathi Assistant Professor

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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	10	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	**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	30	60	50	**50**
K4	-	-	20	20	40	34	**34**
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**PYTHON LAB**							
Course Code	**21UCASP3**					**L**	**P**	**C**
Category	**Skill**					-	2	2
Nature of Course:	**EMPLOYABILITY**	✓	SKILLORIENTED	✓	ENTREPRENEURSHIP			

COURSE OBJECTIVES:

- To learn and understand Python programming basics and paradigm.
- To learn and understand python looping, control statements and manipulations.
- Demonstrate the concepts of GUI controls and designing GUI applications.
- To learn and know the concepts of python programming functions and implement real-time applications

1 **2**	Create a simple calculator to perform the arithmetic operations Using control structures	**6 Hrs**
3 **4** **5**	Functions Recursion String Handling Functions	**6 Hrs**
6 **7** **8**	Using classes and Objects Using Arrays List	**6 Hrs**
9 **10** **11**	Tuple Sequence Dictionaries	**6 Hrs**
12 **13**	Exception Handling Files and Directories	**6 Hrs**
	Total Lecture Hours	**30**

Web Resources

1. **https://www.programiz.com/python-programming/examples**
2. **https://www.geeksforgeeks.org/python-programming-examples/**
3. **https://www.sanfoundry.com/python-problems-solutions/**

Course Outcomes		**K Level**
CO1:	Define and demonstrate the use of built-in data structures and functions	**K3**
CO2:	Interpret the logic into code using functions and modules	**K2**
CO3	Execute the programs using branching, looping and control statements	**K3**
CO3:	Implement static and dynamic web pages using Python tool	**K3**
CO5:	Examine a Python program to solve a specific or real-world problems.	**K4**
	Total Lecture Hours	**30**

CO & PO Mapping:

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

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

LESSON PLAN

	SUBJECT NAME	Hrs	Mode
	1. Create a simple calculator to perform the arithmetic operations 2. Using control structures 3. Functions 4. Recursion 5. String Handling Functions 6. Using classesand Objects 7. Using Arrays 8. List 9. Tuple 10. Sequence 11. Dictionaries 12. Exception Handling 13. Files and Directories	**30**	**PPT**

Course designed by: Mrs. M. Muthulakshmi & Mr. M. Rameshkumar

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

Course Name	**HTML Programming**					
Course Code	**21UCAN31**			**L**	**P**	**C**
Category	**Non-Major Elective**			-	2	2
Nature of Course:	**EMPLOYABILITY**	✓	SKILLORIENTED	**ENTREPRENEURSHIP**		✓

COURSE OBJECTIVES:

- Create HTML Documents with formatting, images, tables, frames
- Develop a static website using Hyper Text Mark-up Language
- Basic Understanding of creating graphics for the web
- Understand the fundamentals of HTML elements and attributes
- To study and apply the Hypertext Markup Language (HTML).

Unit: I	**Introduction to HTML**	**6 hrs**

Designing a Home Page – History of HTML – HTML Generations – HTML Documents – Anchor Tag – Hyper Links –Designing the Body Section: Heading Printing – Aligning the Headings – Horizontal Rule – Paragraph – Tab Strings – Image and Pictures – Embedding PNG Format Image.

Unit: II	**Ordered and Unordered Lists**	**6 hrs**

Ordered and Unordered Lists: lists – Unordered Lists – Headings in a list – ordered Lists – Nested Lists.

Unit: III	**Table Handling:**	**6 hrs**

Table Handling: Tables – Table Creation in HTML – Width of the Table and Cells – Cells Spanning Multiple Rows /Columns –Coloring Cells – Column Specification.

Unit: IV	**Frames:**	**6 hrs**

Frameset Definition – Frame Definition – Nested Framesets

Unit: V	**Forms:**	**6 hrs**

Action Attribute – Method Attribute – Enctype Attribute –Drop Down List-Sample Forms.

1.http:// www.w3schools.com / html / html_exercises
2. http://www.landofcode.com/html-exercises/
3. https://spoken-tutorial.org/tutorial-search/?search_foss=HTML&search_language

Course Outcomes:		**K Level**
CO1:	Identifying the important HTML tags for designing static pages and separate design from content using Cascading Style sheet	**K3**
CO2:	Experimenting screen-based user interfaces, with graphics, textual components, and navigation systems to achieve a unified, functional environment that results in static web pages.	**K3**

CO3:	Differentiate between linked, embedded and inline style specifications	**K4**
CO4:	Correlate a web page and identify its elements and attributes	**K4**
CO5:	Categorize the rules and techniques to create and design the web pages	**K4**

CO & PO Mapping:

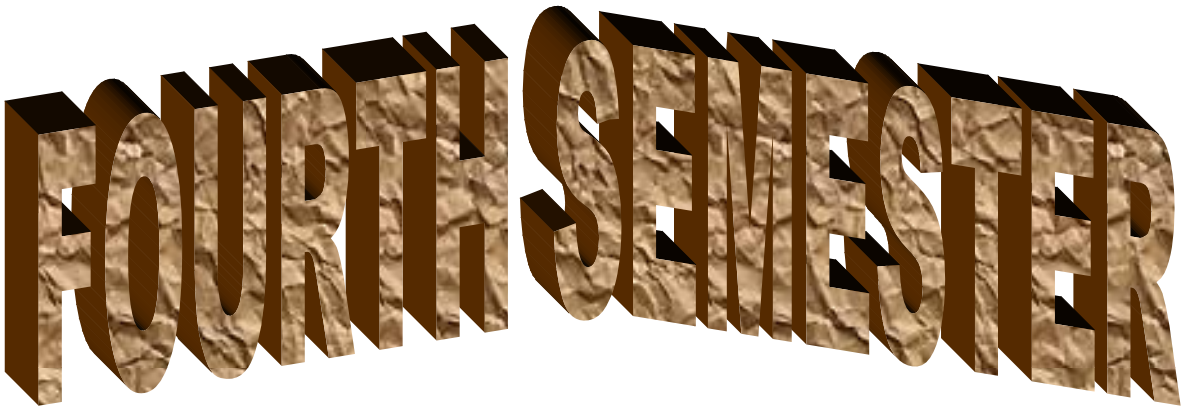
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	**3**	**2**	**3**	**2**	**3**	**3**
CO 2	**2**	**2**	**3**	**2**	**2**	**3**
CO 3	**3**	**2**	**3**	**3**	**2**	**2**
CO 4	**2**	**3**	**2**	**3**	**2**	**3**
CO 5	**2**	**3**	**3**	**3**	**3**	**3**

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

LESSON PLAN

UNIT	HTML Programming	Hrs	Pedagogy
I	**Introduction to HTML**: Designing a Home Page – History of HTML – HTML Generations – HTML Documents – Anchor Tag – Hyper Links –Designing the Body Section: Heading Printing – Aligning the Headings – Horizontal Rule – Paragraph – Tab Strings – Image and Pictures –Embedding PNG Format Image.	**6**	**Chalk & Talk, ICT Kit**
II	**Ordered and Unordered Lists**: Ordered and Unordered Lists: lists – Unordered Lists – Headings in a list – ordered Lists – Nested Lists.	**6**	**Chalk & Talk, ICT Kit**
III	**Table Handling:** Table Handling: Tables – Table Creation in HTML – Width of the Table and Cells – Cells Spanning Multiple Rows /Columns –Coloring Cells – Column Specification.	**6**	**Chalk & Talk, ICT Kit**
IV	**Frames:** Frameset Definition – Frame Definition – Nested Framesets	**6**	**Chalk & Talk, ICT Kit**
V	**Forms:** Action Attribute – Method Attribute – Enctype Attribute – Drop Down List-Sample Forms.	**6**	**Chalk & Talk, ICT Kit**

Course designed by: Dr. R. Bagavathi Lakshmi & M. Muthulakshmi


FOURTH SEMESTER

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

Course Name	**DATABASE MANAGEMENT SYSTEM**							
Course Code	**21UCAC41**					**L**	**P**	**C**
Category	**Core**					5	-	4
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP			

Course Objectives:

- To understand the basic concepts of database systems and familiar with database storage structures.
- Develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.
- To emphasize the importance of normalization in databases.
- To Master the basics of SQL and construct queries using SQL.
- To understand the concepts of PL/SQL cursors and triggers.

Unit: I	**Data, Information and Information Processing**	15 Hrs

Introduction – Definition of information, Quality of information. **Files, File organization and file structures:** Introduction – Operations on files – File storage organization – Storage media. **Introduction to Database Management System (DBMS):** Introduction – Why a database – Characteristics of data in a Database – Why DBMS – Types of Data Base Management System.

Unit: II	**Introduction to Relational Database Management System:**	15 Hrs

Introduction – RDBMS terminology – The Relational data structure – Relational data manipulation – Codd's rules. **Entity - Relationship (E-R) Modeling:** E-R model – Components of an E-R model – E-R modeling symbols. **Data Normalization:** Introduction – First Normal Form – Second Normal Form – Third Normal Form – Boyce–Codd Normal Form – Fourth Normal Form – Fifth Normal Form

Unit: III	**Relational algebra and Relational calculus:**	15 Hrs

Relational algebra - Relational calculus. **Introduction to Structured Query Language:** Introduction – Characteristics of SQL - Advantages of SQL – SQL data types and Literals – Types of SQL commands – SQL operators – Arithmetic, Comparison operators - Logical operators - Set operators – Operator precedence.

Unit: IV	**Tables, Views and Indexes:**	15 Hrs

Tables-Views. **Queries and Sub queries**: Queries – Sub queries. **Aggregate functions** – **Joins and Unions:** Joins.

Unit: V	**Introduction to PL/SQL:**	15 Hrs
PL/SQL Blocks – PL/SQL Architecture- PL/SQL variables – PL/SQL data types – Control Structures – Cursors – PL/SQL Exceptions – PL/SQL Triggers – Types of Triggers		
	Total Lecture Hours	75 Hrs

Books for Study:

Alexis Leon and Mathews Leon, Database Management Systems, Leon Vikas Publishing, New Delhi, 1999.

Unit I : Chapter 1,3 and 5
Unit II : Chapter 7,9 and 11

Unit III : Chapter 12 and 14 Unit IV : Chapter 15,17,18 and 21 Unit V : Chapter 46-D
Book for References:
1. Abraham Silberschtz, Henry F. Korth, S.Sudershan, Data Base System Concepts, 4th Edition, McGraw Hill International Editions, New Delhi, 2002. 2. Date C.J., An Introduction to Database Systems Vol.1, Narosha Publishing House, New Delhi, 1995. 3. Rob, Coronel, "Database Systems",Seventh Edition, Cengage Learning.
Web Resources:
1. https://onlinecourses.nptel.ac.in/noc18_cs15/preview **2. http://nptel.ac.in/courses/106106095/** **3. https://www.javatpoint.com/dbms-tutorial**

Course Outcomes:		**K Level**
At the end of the course the students will be able to		
CO1	Enumerate the underlying concepts of the management of database systems.	**K2**
CO2	Describe the structure and model of the relational database System	**K2**
CO3	Analyze a database based on a data model considering the normalization to a specified level	**K4**
CO4	Solve simple and moderately advanced database queries using Structured Query Language (SQL)	**K3**
CO5	Explaining multiple tables using group functions, sub queries and Implement cursor and trigger concept for a given scenario	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

UNIT	DATABASE MANAGEMENT SYSTEM	Hrs	Pedagogy
I	**Data, Information and Information Processing:** Introduction – Definition of information, Quality of information. **Files, File organization and file structures:** Introduction – Operations on files – File storage organization – Storage media. **Introduction to Database Management System (DBMS):** Introduction – Why a database – Characteristics of data in a Database – Why DBMS – Types of Data Base Management System.	15	**Chalk & Talk, ICT Kit**
II	**Introduction to Relational Database Management System:** Introduction – RDBMS terminology – The Relational data structure – Relational data manipulation – Codd's rules. **Entity - Relationship (E-R) Modelling:** E-R model – Components of an E-R model – E-R modelling symbols. **Data Normalization:** Introduction – First Normal Form – Second Normal Form – Third Normal Form – Boyce – Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization.	15	**Chalk & Talk, ICT Kit**
III	**Relational algebra and Relational calculus:** Relational algebra - Relational calculus. **Introduction to Structured Query Language:** Introduction – Characteristics of SQL - Advantages of SQL – SQL data types and Literals – Types of SQL commands – SQL operators – Arithmetic, Comparison operators - Logical operators - Set operators – Operator precedence.	15	**Chalk & Talk, ICT Kit**
IV	**Tables, Views and Indexes:** Tables-Views. **Queries and Sub queries**: Queries – Sub queries. **Aggregate functions** – **Joins and Unions:** Joins.	15	**Chalk & Talk, ICT Kit**
V	**Introduction to PL/SQL:** PL/SQL Blocks – PL/SQL Architecture- PL/SQL variables – PL/SQL data types – Control Structures – Cursors – PL/SQL Exceptions – PL/SQL Triggers – Types of Triggers	15	**Chalk & Talk, ICT Kit**

Course Designed by: **Mrs. R.Vasuki & Dr. R. Bagavathi Lakshmi**

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**	**K3**	2	K1,K2	1	K1	2(K3,K3)	1(K3)
	CO2	**K3**	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	**CO3**	**K3**	2	K1,K2	1	K1	2(K3,K3)	1(K3)
	CO4	**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	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	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
	K5	-	-	-	-	-	-	-
	Marks	4	6	20	20	50		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 Questions	K – Level		
1	CO1	K2	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K2	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K4	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K3	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**DATABASE MANAGEMENT SYSTEM – LAB**							
Course Code	**21UCACP4**					**L**	**P**	**C**
Category	**Core Lab**					-	4	4
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	ENTREPRENEURSHIP			

COURSE OBJECTIVES:

- To provide a sound introduction to the creation of problem statements from real life situations.
- To give a good formal foundation on the relational model of data.
- To introduce the concepts of basic SQL as a universal Database language.
- To enable the design of an efficient database using normalization concepts.
- To have an introductory knowledge about the PL/SQL concept.

	SQL COMMAND	**15**
1. DDL: Experiments using database DDL SQL statements 2. DML: Experiment using database DML SQL statements 3. DCL: Experiment using database DCL SQL statements		
	SQL QUERIES	**15**
4. SQL Queries: Aggregate functions 5. SQL Queries: Joins 6. SQL Queries: String functions and Numeric functions 7. SQL Queries: Pattern matching ,Logical and Relational operators Views		
	PL/SQL	**30**
1. Simple programs in PL/SQL 2. Exception Handling: PL/SQL Procedure for application using exception handling 3. Functions: PL/SQL Procedure for application using functions 4. Cursor: PL/SQL Procedure for application using cursors 5. Trigger: PL/SQL Procedure for application using triggers		
	Total Lecture Hours	**60**

Web Resources:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.w3schools.com/sql/
3. https://www.javatpoint.com/dbms-sql-introduction

Course Outcomes		**K Level**
At the end of the course the students will be able to		
CO1:	Summarize data manipulation language to query, update and manage a database	**K2**
CO2:	Demonstrate the fundamental elements of relational database management systems	**K3**
CO3:	Analyze the database using queries to retrieve records	**K4**
CO4:	Illustrate views to satisfy the user's changing requirements	**K4**
CO5:	Examine PL/SQL for processing data base.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

	DATABASE MANAGEMENT SYSTEM - LAB	Hrs	Pedagogy
	SQL COMMAND 1.DDL: Experiments using database DDL SQL statements 2.DML: Experiment using database DML SQL statements 3.DCL: Experiment using database DCL SQL statements	**15**	**DEMO&PPT**
	SQL QUERIES 4.SQL Queries: Aggregate functions 5.SQL Queries: Joins 6.SQL Queries: String functions and Numeric functions 7.SQL Queries: Pattern matching ,Logical and Relational operators 8.Views	**15**	**DEMO&PPT**
	PL/SQL 1.Simple programs in PL/SQL 2.Exception Handling: PL/SQL Procedure for application using exception handling 3.Functions: PL/SQL Procedure for application using functions 4.Cursor: PL/SQL Procedure for application using cursors 5.Trigger: PL/SQL Procedure for application using triggers	**30**	**DEMO&PPT**

Course Designed by Mrs. R.Vasuki & Dr. R.Bagavathi Lakshmi

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

Course Name	**BASICS OF COST ACCOUNTING**							
Course Code	**21UCOA42**					**L**	**P**	**C**
Category	**Allied**					5	-	4
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENEURSHIP**			✓

Course Objectives:

- To enable the students to be aware of Meaning, Elements of Cost, Material Cost, Labour and overheads cost as an element of total cost.
- To train the students in finding the cost of products using different methods of costing.
- To enable the students to be aware of process costing as amethods of costing and its application and accuracy of cost sheet.
- Use accounting methods of cost calculation.

Unit: I	**Introduction**	**15 hours**

Introduction**:** Definition of Costing – Objects & advantages of costing – Difference between Cost accounting & Financial accounting – Installation of costing system – Classification and analysis of costs – Specimen of Cost Sheet - Preparation of cost sheet (simple problems only)

Unit: II	**Materials**	**15 hours**

Materials**:** Maintenance of stores & records -E.O.Q — Different Level of Stock-Reorder level- Maximum Level- Minimum Level- Average level and Danger Level – Pricing of material issues (FIFO, LIFO)

Unit: III	**Labour**	**15 hours**

Labour Turn over – Methods of Remunerating Labour – Incentive Schemes- Halsey – Rowan & Taylor's Differential piece rate system (Simple problems Only).

Unit: IV	**Overheads**	**15 hours**

Overheads: Meaning – Classification – Specific System - Allocation, Apportionment & Absorption of overheads - Primary and Secondary Distribution of Overhead

Unit: V	Budget and Budgetary Control	**15 hours**

Meaning – Objectives – Advantages – Limitations – Classification of Budgets – Preparation of Functional budgets – Material purchase budget, sales budget and Cash budget.

	Total Lecture Hours	**75 Hrs**

Books for Study:

S.N. Maheswari, **Cost Accounting**, Sultan Chand & Sons (P) Ltd., New Delhi, Reprinted 2011.
Unit I – Chapters 1(Full), 2(Full)
Unit II – Chapters 3(Full), 4(Full)
Unit III – Chapters 6(Full), 7(Full)
Unit IV– Chapters 9(Full), 10(Full)
Unit V - Section C (C.1-C.52)

Books for References:

1. S.P. Jain and K.L.Narang, **Cost Accounting**, Kalyani Publishers, New Delhi, Reprinted 2011.
2. R.S.N. Pillaiand S. Bhagavathy, **Cost Accounting**, S.Chand Company Ltd, New Delhi, Reprint with corrections 2011.

3.Jain, S/ Narang, K. 8th rev edKalyani**, Advanced *Cost* & Management *Accounting,*** 4th editionNote: The Questions should be asked in the ratio of 60% as problems and 40% as theory.
Web Resources:
https://corporatefinanceinstitute.com **www.liedunote.com**

Course Outcomes		**K Level**
CO1:	Through knowledge about meaning, methods, types and elements of cost.	**Up to K3**
CO2:	Analysis the various techniques of Material control.	**Up to K3**
CO3:	Attain knowledge on the accounting Methods of Wage payments, Labour Turnover and Causes and Remedies	**Up to K3**
CO4:	Through knowledge of Primary and Secondary Distribution of Overhead, and Machine hour Rate.	**Up to K4**
CO5:	To gain the knowledge on budget and budgetary control and prepare various types of budgeting.	**Up to K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction**:** Definition of Costing – Objects & advantages of costing – Difference between Cost accounting & Financial accounting – Installation of costing system – Classification and analysis of costs – Specimen of Cost Sheet - Preparation of cost sheet (simple problems only)	**18 Hrs**	**Black Board & PPT**
II	Materials**:** Maintenance of stores & records -E.O.Q — Different Level of Stock(Reorder level, Maximum Level, Minimum Level, Average level and Danger Level) – Pricing of material issues (FIFO, LIFO)	**18 Hrs**	**Black Board & PPT**
III	Labour**:** Labour Turn over – Methods of Remunerating Labour – Incentive Schemes- Halsey – Rowan & Taylor's Differential piece rate system (Simple problems Only).	**18 Hrs**	**Black Board & PPT**
IV	Overheads : Meaning – Classification – Allocation, Apportionment & Absorption of overheads - Primary and Secondary Distribution of Overhead – Machine Hour Rate (Simple problems Only).	**18 Hrs**	**Black Board & PPT**
V	Budget and Budgetary Control: Meaning – Objectives – Advantages – Limitations – Classification of Budgets – Preparation of Functional budgets – Material purchase budget, sales budget and Cash budget.	**18 Hrs**	**Black Board & PPT**

Course Designed by: **Dr. N. Saraswathi & Dr.S.Pandeeswari**

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CIA II	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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	10	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	**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	30	60	50	50
K4	-	-	20	20	40	34	34
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	K1	
12	CO2	K1	
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**R Programming Lab**				
Course Code	**21UCASP4**		**L**	**P**	**C**
Category	**Skill**		-	2	2
Nature of Course:	EMPLOYABILITY	**SKILLORIENTED** ✓	ENTREPRENEURSHIP		

COURSE OBJECTIVES:

- Expand R by installing R packages
- Identify and deal with missing data
- Manipulate strings in R
- Explore and understand how to use the R documentation
- Understand the different data types and structures in R

1 **2**	Write an R program to take input from the user (name and age) and display the values. Also print the version of R installation. To create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.	**6 hrs**
3 **4**	Write an R program to get the first 10 Fibonacci numbers. To convert a given matrix to a 1 dimensional array.	**6 hrs**
5 **6**	To create an array using four given columns, three given rows, and two given tables and display the content of the array. To find the maximum and the minimum value of a given vector.	**6 hrs**
7 **8**	To create a list containing strings, numbers, vectors and a logical values. To count number of objects in a given list.	**6 hrs**
9 **10**	To extract 3rd and 5th rows with 1st and 3rd columns from a given data frame. To get the structure of a given data frame.	**6 hrs**
	Total Lecture Hours	**30**

Web Resources:

1. **www.w3schools.com › R › R_exercises**
2. **http://www.landofcode.com/R-exercises/**
3. **https://spoken-tutorial.org/tutorial-search/?search_foss=R&search_language=**

Course Outcomes		**K Level**
At the end of the course the students will be able to		
CO1:	Understand basic concepts such as data type and index and use them in their work.	**K2**
CO2:	Demonstrate use of basic functions.	**K3**
CO3:	Understand, Analyze, Interpret Correlation and Regression to analyze the underlying relationships between different variables.	**K2**
CO4:	Analyze and create loops to solve different types of problems.	**K4**
CO5:	Experimenting Probability and Probability Distributions to solve a wide variety of problems.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

	List of Programs	Hrs	Pedagogy
1 2	Write an R program to take input from the user (name and age) and display the values. Also print the version of R installation. To create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.	6 hrs	PPT
3 4	Write an R program to get the first 10 Fibonacci numbers. To convert a given matrix to a 1 dimensional array.	6 hrs	PPT
5 6	To create an array using four given columns, three given rows, and two given tables and display the content of the array. To find the maximum and the minimum value of a given vector.	6 hrs	PPT
7 8	To create a list containing strings, numbers, vectors and a logical values. To count number of objects in a given list.	6 hrs	PPT
9 10	To extract 3rd and 5th rows with 1st and 3rd columns from a given data frame. To get the structure of a given data frame.	6 hrs	PPT

Course Designed by Dr. R. Bagavathi Lakshmi & Mrs. R. Vasuki

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

Course Name	**MULTIMEDIA**					
Course Code	**21UCAN41**			**L**	**P**	**C**
Category	**Non-Major Elective**			2	-	2
Nature of course:	**EMPLOYABILITY**	✓	SKILL ORIENTED	ENTREPRENURSHIP		

Course Objectives:

- To understand multimedia in respect to many application including business, schools, home, education
- To develop multimedia skills understanding the principal players of individual players in multimedia teams in developing projects.
- To have an introductory knowledge about text and graphics.
- To will learn the cost involved in multimedia planning, designing, and producing.
- To introduce the concept of Digital Video and animation.

Unit: I	**Introduction**	**5 hours**
Objectives-Introduction to Multimedia -The Multidimedia Market-Content and Copyright – Resources for Multimedia developers.		
Unit: II	**Text**	**10 hours**
Elements of Text –Text Data Files – Using Text in Multimedia Applications – Hypertext – **Graphics:** Element of Graphics – Images and Color – Graphics File and Application Formats-Obtaining Images for Multimedia Use-Using Graphics in Multimedia Applications		
Unit: III	**Digital Video and Animation**	**5 hours**
Background on Video – Characteristics of Digital Video – Digital Video Data sizing – Video Capture and Playback systems- Computer Animation-		
Unit: IV	**Product Design**	**4hours**
Building Blocks- Classes of Products- Content Organizational Strategies- Storyboarding		
Unit: V	**Multimedia and the Internet**	**6 hours**
The Internet-HTML and Web Authoring –Multimedia Considerations for the Internet – Design Considerations for Web Pages		
	Total Lecture Hours	**30 Hrs**

Books for Study:

David Hillman, **MULTIMEDIA TECHNOLOGY & APPLICATIONS**, Galgotia Publications pvt Ltd., New Delhi, Reprinted 2014.

Unit I – Chapters 1(Full)
Unit II – Chapters 4(Full), 5(Full)
Unit III – Chapters 7(Full)
Unit IV– Chapters 8(Full)
UNIT V –Chapter 10(Full)

Books for References:

1. Tay Vaughan, **Multimedia: Making It Work**, Eighth Edition,MC graw hill publishers, printed 1993.
2. Ralf Steinmetz and Klara Nahrstedt, **Multimedia Systems**, X.media.publishers ,printed 2004.
3. R Steinmetz , **Multimedia systems : computing, communication and applications**.,

WorldCat publishers 1995.
Web Resources:
1. https://onlinecourses.swayam2.ac.in/nou20_cs05/preview **2. https://www.geeksforgeeks.org/what-is-multimedia/** **3. https://www.tutorialspoint.com/multimedia/multimedia_introduction.htm**

Course Outcomes		**K Level**
CO1:	Define multimedia to potential clients.	**K2**
CO2:	Identify different media and its representations in data.	**K2**
CO3:	Discuss various audio and video file formats.	**K2**
CO4:	Explain basic components of multimedia products.	**K2**
CO5:	Demonstrate the role of internet in multimedia applications.	**K2**

CO & PO Mapping:

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

***3–**Advanced Application;**2–**Intermediate Development; **1-**IntroductoryLevel

LESSON PLAN

UNIT	Introduction	Hrs	Pedagogy
I	Objectives-What is Multimedia?-The Multidimedia Market-Content and Copyright – Resources for Multimedia developers	5	**Chalk & Talk, ICT Kit**
II	**Text** Elements of Text –Text Data Files – Using Text in Multimedia Applications – Hypertext – **Graphics:** Element of Graphics – Images and Color – Graphics File and Application Formats-Obtaining Images for Multimedia Use-Using Graphics in Multimedia Applications	10	**Chalk & Talk, ICT Kit**
III	**Digital Video and Animation:** Background on Video – Characteristics of Digital Video – Digital Video Data sizing – Video Capture and Playback systems-Computer Animation	5	**Chalk & Talk, ICT Kit**
IV	**Product Design** Building Blocks- Classes of Products- Content Organizational Strategies- Storyboarding	4	**Chalk & Talk, ICT Kit**
V	**Multimedia and the Internet** The Internet-HTML and Web Authoring –Multimedia Considerations for the Internet – Design Considerations for Web Pages	6	**Chalk & Talk, ICT Kit**

Course Designed by: Mrs. R. Vasuki & Dr. R. Bagavathi Lakshmi


FIFTH SEMESTER

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

Course Name	**OPERATING SYSTEM**			
Course Code	**21UCAC51**	**L**	**P**	**C**
Category	**Core**	6	-	4

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Discover the main components of an Operating System and their functions.
- Analyze the process management and scheduling.
- Understand the concepts and implementation of Memory management policies and virtual memory.
- Assess the need for special purpose operating system with the advent of new emerging technologies.
- Examine various issues in Inter Process Communication (IPC) and the role of OS in IPC.

Unit: I	**Introduction to Operating System and Process Concepts**	**18hrs**

Introduction - What Is An Operating System- Operating System Components And Goals - Operating System Architecture. Process Concepts: Introduction - Process States - Process Management- Interrupts - Interprocess Communication

Unit: II	**Asynchronous Concurrent Execution and Deadlock**	**18hrs**

Introduction - Mutual Exclusion - Implementing Mutual Exclusion Primitives - Software Solutions To The Mutual Exclusion Problem – Semaphores - Deadlock: Introduction - Four Necessary Conditions For Deadlock - Deadlock Solutions - Deadlock Prevention - Deadlock Avoidance With Dijkstra's Banker's Algorithm - Deadlock Detection - Deadlock Recovery.

Unit: III	**Processor Scheduling**	**18hrs**

Introduction - Scheduling Levels – Preemptive Vs Non-Preemptive Scheduling - Priorities - Scheduling Objective - Scheduling Criteria - Scheduling Algorithms.

Unit: IV	**Real Memory Organization And Virtual Memory Management**	**18hrs**

Introduction - Memory Organization - Memory Management - Memory Hierarchy - Memory Management Strategies - Contiguous Vs Non Contiguous Memory Allocation - Fixed Partition Multiprogramming - Variable Partition Multiprogramming Virtual Memory Management:Introduction - Page Replacement - Page Replacement Strategies.

Unit: V	**File and Database Systems**	**18hrs**

Introduction - Data Hierarchy – Files - File System - File Organization - File Allocation - Free Space Management - File Access Control.

	Total Lecture Hours	**90 Hrs**

Books for Study:

1. H.M.Deitel,P.J.Deitel,D.R.Choffnes, Operating System, Pearson Education, Third Edition, 2011.

Unit I Chapter 1: 1.1,1.2,1.12,1.13,
Chapter 3: 3.1 - 3.5
Unit II Chapter 5: 5.1,5.2,5.3,5.4(up to 5.42),5.6
Chapter 7: 7.1,7.5 - 7.10
Unit III Chapter 8: 8.1 - 8.7
Unit IV Chapter 9: 9.1 - 9.6,9.8,9.9
Chapter11: 11.1,11.5,11.6

Unit V Chapter 13: 13.1 - 13.8
Books for References:
1. Pramod Chandra P.Bhatt, An Introduction to Operating Systems Concepts and Practice, PHI 2nd Edition, 2008. 2. Silberschatz A, Galvin P.B., Gange G, Operating System Concepts, John Wiley& Sons, INC,New Delhi, Sixth Edition, 2002. 3. Milan Milenkovic, Operating System Concepts and Design, Tata McGraw Hill, New Delhi, Third Edition, 1997
Web Resources:
1. **https://nptel.ac.in/downloads/106108101/** 2. **http://williamstallings.com/Extras/OS-Notes/notes.html** 3. **https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Discover the evolution and basic components of operating system.	**K3**
CO2:	Demonstrate and Describe the concepts of process, operations, scheduling and deadlock.	**K3**
CO3:	Illustrate the concepts and implementations of Memory Management policies and virtual memory.	**K3**
CO4:	Apply the knowledge of Scheduling and Scheduling Algorithms.	**K4**
CO5:	Examine and Discuss the features of Disk Scheduling and Management.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Introduction to Operating System:** Introduction - What Is An Operating System- Operating System Components And Goals - Operating System Architecture. **Process Concepts:** Introduction - Process States - Process Management- Interrupts - Interprocess Communication	**18Hrs**	**Chalk & Talk,ICT Kit**
II	**Asynchronous Concurrent Execution:** Introduction - Mutual Exclusion -Implementing Mutual Exclusion Primitives - Software Solutions To The Mutual Exclusion Problem – Semaphores - **Deadlock:** Introduction - Four Necessary Conditions For Deadlock - Deadlock Solutions - Deadlock Prevention - Deadlock Avoidance With Dijkstra's Banker's Algorithm - Deadlock Detection - Deadlock Recovery.	**18Hrs**	**Chalk & Talk,ICT Kit**
III	**Processor Scheduling:** Introduction - Scheduling Levels - PreemptiveVs Non-Preemptive Scheduling - Priorities - Scheduling Objective - Scheduling Criteria - Scheduling Algorithms.	**18Hrs**	**Chalk & Talk,ICT Kit**
IV	**Real Memory Organization:** Introduction - Memory Organization - Memory Management - Memory Hierarchy - Memory Management Strategies - Contiguous Vs Non Contiguous Memory Allocation - Fixed Partition Multiprogramming - Variable Partition Multiprogramming **Virtual Memory Management:** Introduction - Page Replacement - Page Replacement Strategies.	**18Hrs**	**Chalk & Talk,ICT Kit**
V	**File and Database Systems:** Introduction - Data Hierarchy – Files - File System - File Organization - File Allocation - Free Space Management - File Access Control.	**18Hrs**	**Chalk & Talk,ICT Kit**

Course Designed by: Mrs. M. Muthulakshmi, & R.Vasuki Assistant Professor

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**COMPUTER NETWORKS**			
Course Code	**21UCAC52**	**L**	**P**	**C**
Category	**Core**	6	-	4

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- To understand the concepts of computer networking basics.
- To know the various transmission media such as guided and unguided
- To develop and understanding of different components, of computer networks, various protocols.
- To analyze overall networking standards and to implement all the protocols.
- To able to know the importance of security in data communications and networking

Unit: I	**Introduction to Data Communications and Networks**	**18**

Introduction - Data Communications – Networks – The Internet – Protocols and standards – **Network Models**: Layered tasks – The OSI Model – Layers in the OSI Model - TCP/IP Protocol suite

Unit: II	**Transmission Media**	**18**

Introduction– Guided media – Unguided media – Other wireless Networks : Cellular Telephony – Satellite Networks.

Unit: III	**Error Detection and Correction**	**18**

Introduction –Block Coding – Linear Block codes – Cyclic codes – Checksum – **Data Link Control** : Framing – Flow and Error Control – Data Link Layer Protocols – Noiseless Channels – Noisy Channels -HDLC – Point to Point Protocol

Unit: IV	**Network Layer**	**18**

Network Layer Services – Packet Switching – IPV4 Addresses – Forwarding of IP packets- Delivery – Forwarding - Unicast Routing Protocols – Multicasting Routing Protocols

Unit: V	**Cryptography and Network Security**	**18**

Introduction – Symmetric key Cryptography-Asymmetric key Cryptography- Security Services – Message Confidentiality – Message Integrity – Message Authentication – Digital Signature

	Total Lecture Hours	**90 Hrs**

Books for Study:

Behrouz a Forouzan, Data Communications and Computer Networks, McGraw-Hill Pvt Ltd., New Delhi, Fifth Edition, 2011

UNIT I: Chapter 1 Section -1.1-1.4
Chapter 2 Section -2.1-2.4
UNIT II: Chapter 7 Section 7.1,7.2
Chapter 16 Section - 16.1,16.2
UNIT III: Chapter 10 Section 10.1-10.5
Chapter 11 Section 11.1-11.5
UNIT IV: Chapter 19 Section 19.1-19.2
Chapter 20 Section 20.1-20.4
UNIT V: Chapter 22 Section 22.1 – 22.4

Chapter 31 Section 31.1-31.6
Books for References:
1. Andrew S.Tanebaum, Computer Networks, Prentice Hall of India, New Delhi, Fifth Edition 2014 2. Prakash C.Gupta,Data Communication and Computer Networks, Prentice Hall of India, New Delhi, Third Edition 2006.
Web Resources:
1. https://www.journals.elsevier.com/computer-networks **2. https://www.tutorialspoint.com/computer_fundamentals/computer_networking.html** **3. https://www.guru99.com/types-of-computer-network.html**

Course Outcomes		**K Level**
CO1:	Able to Understand the fundamental concepts of Computer Networking	**K3**
CO2:	Able to choose the transmission media	**K3**
CO3:	Able to understand the concepts of error detection and correction and working of protocols	**K3**
CO4:	Able to determine the network services,IPV4 addresses, unicast and multicasting protocols	**K4**
CO5:	Able to determine the services of network security	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Introduction to Data Communications and Networks:** Data Communications – Networks – The Internet – Protocols and standards – **Network Models**: Layered tasks – The OSI Model – Layers in the OSI Model - TCP/IP Protocol suite	18	Black Board/PPT
II	**Transmission Media: Introduction–** Guided media – Unguided media – Other wireless Networks : Cellular Telephony – Satellite Networks.	18	Black Board/PPT
III	**Error Detection and Correction: Introduction** –Block Coding – Linear Block codes – Cyclic codes – Checksum – **Data Link Control** : Framing – Flow and Error Control – Data Link Layer Protocols – Noiseless Channels – Noisy Channels -HDLC – Point to Point Protocol	18	Black Board/PPT
IV	**Network Layer:** Network Layer Services – Packet Switching – IPV4 Addresses – Forwarding of IP packets- Delivery – Forwarding - Unicast Routing Protocols – Multicasting Routing Protocols	18	Black Board/PPT
V	**Cryptography and Network Security:** Introduction – Symmetric key Cryptography-Asymmetric key Cryptography- Security Services – Message Confidentiality – Message Integrity – Message Authentication – Digital Signature	18	Black Board/PPT

Course Designed by: M.Ramesh Kumar & Mrs M.Muthulakshmi Assistant Professor

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1.K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	K4	2	K1,K2	2	K2	2(K3,K3)	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

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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K3)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K3)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K4)**
5	CO5	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**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	4	10	-	19	15.83	16
K2	5	6	10	20	41	34.16	34
K3	-	-	30	30	60	50	50
K4	-	-	-	-	-		
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	K1	
12	CO2	K1	
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	K1	
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K2	
18) b	CO3	K2	
19) a	CO4	K3	
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**LINUX LAB**			
Course Code	**21UCACP5**	**L**	**P**	**C**
Category	**Core Lab**	-	6	4
Nature of course:	**EMPLOYABILITY** ✓	**SKILL ORIENTED** ✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Write useful shell scripts which greatly and effectively enhance the usefulness of computers.
- Understand basics of various OS related concepts, from programmer's point of view.
- Develop applications where several processes need to communicate with each other to complete a task.
- Explain some of the different distribution of Linux and the reason for open source.
- Use Linux commands to manage files and file systems.

Cycle I		**15hrs**

1. Basic Commands in Linux.
2. Number Checking in Linux
3. Multiplication Table in Linux.
4. Roman Letter Conversion in Linux.

Cycle II		**15hrs**

5. Checking File or Directory in Linux.
6. File Operations in Linux- Create, Copy, Delete, Rename
7. Directory Operations in Linux- Create, Remove, Toggle
8. Directory Operations in Linux : Copy, Move

Cycle III		**15hrs**

9. Write a program to emulate the Unix Is —I command.
10. Listing the files regarding their names in Linux.
11. Changing the access rights in Linux.
12. Counting number of users currently logged in Linux.

Cycle IV		**15hrs**

13. List of files having full access rights in Linux.
14. Counting number of lines, words and characters in a file in Linux
15. Fibonacci series in shell scripting.
16. Checking odd or even in shell scripting

Cycle V		**15hrs**

17. List all of the directory files in a directory.
18. Find factorial of a given integer.
19. Count the number of lines in a file that do not contain vowels.
20. Find the number of characters, words and lines in a file.

	Total Lecture Hours	**60 Hrs**

Web Resources:

1. https://nptel.ac.in/courses/117/106/117106113/
2. https://www.guru99.com/must-know-linux-commands.html
3. https://www.tutorialspoint.com/unix/unix-quick-guide.htm

Course Outcomes		K Level
At the end of the course the students will be able to		
CO1:	Associate the student setup users and groups, Configure user defaults, logins and user profiles.	K2
CO2:	Use UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.	K3
CO3:	Illustrate simple file processing operations and use UNIX/Linux utilities	K3
CO4:	Classify directory structures with appropriate security,	K4
CO5:	Examine shell scripts to perform more complex tasks.	K4

CO & PO Mapping:

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	3	3	3	2
CO 3	2	2	2	3	2	2
CO 4	2	2	2	2	2	2
CO 5	3	2	2	2	2	3

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

LESSON PLAN

Cycle	LINUX LAB	Hrs	Pedagogy
I	Basic Commands in Linux. Number Checking in Linux Multiplication Table in Linux. Roman Letter Conversion in Linux.	12	Black Board, Lab Demonstration and LCD Projector.
II	Checking File or Directory in Linux. File Operations in Linux- Create, Copy, Delete, Rename Directory Operations in Linux- Create, Remove, Toggle Directory Operations in Linux : Copy, Move	12	Black Board, Lab Demonstration and LCD Projector.
III	Write a program to emulate the Unix Is —I command. Listing the files regarding their names in Linux. Changing the access rights in Linux. Counting number of users currently logged in Linux.	12	Black Board, Lab Demonstration and LCD Projector.
IV	List of files having full access rights in Linux. Counting number of lines, words and characters in a file in Linux Fibonacci series in shell scripting. Checking odd or even in shell scripting	12	Black Board, Lab Demonstration and LCD Projector.
V	List all of the directory files in a directory. Find factorial of a given integer. Count the number of lines in a file that do not contain vowels. Find the number of characters, words and lines in a file.	12	Black Board, Lab Demonstration and LCD Projector.

Course Designed by: **Mrs. M. Muthulakshmi & V.Bhavani Assistant Professor**

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

Course Name	**DATA MINING AND WAREHOUSING**			
Course Code	**21UCAE51**	**L**	**P**	**C**
Category	**Core**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives :

- Understand Data Warehouse fundamentals, Data Mining Principles
- Design Data warehouse with dimensional modeling and apply OLAP operations.
- Identify appropriate data mining algorithms to solve real world problems.
- Compare and evaluate different data mining techniques like classification, prediction Clustering and Association Rule mining
- Describe complex data types with respect to spatial and web mining

Unit: I	**Data Warehousing :**	**15hrs**

Introduction – Data warehouse Architecture – Dimensional modelling – Categorization of hierarchies – Aggregate function – Summarisability – OLAP operations – OLAP Server – Coalescing – DWARF – Data Marting – Data Cleaning – Cloud Data Warehousing.

Unit: II	**Data Mining:**.	**15hrs**

What is Data Mining? – Data Mining Definitions – KDD vs Data Mining – DBMS vs DM – other related areas - DM techniques – Other Mining problems – Issues and challenges in DM – DM application areas – DM applications – Case studies

Unit: III	**Association Rules**.	**15hrs**

What is an Association Rule – Methods to discover Association rules – Apriori algorithm – Partition algorithm – Rapid Association Rule Mining (RARM) – Incremental Algorithm – Association Rules with Item Constraints

Unit: IV	**Clustering Techniques:**	**15hrs**

Clustering Paradigms - Partitioning algorithms – Kmedoid Algorithms – CLARA – CLARANS – Hierarchical clustering DB scan – Categorical Clustering algorithm – STIRR. **Decision trees:** What is a Decision tree? –Tree construction principle – Best split – Splitting indices – Splitting Criteria – Decision tree construction algorithms – CART – ID3-C4.5

Unit: V	**Web Mining**	**15hrs**

Introduction – Web Mining – We content mining – Web structure mining – Web usage mining – Text Mining- Unstructured text – Text Clustering – **Temporal Data Mining:** -Temporal Data Mining and its Association Rules – Sequence Mining – Spatial Mining and its tasks – Spatial Clustering.

	Total Lecture Hours	**75 Hrs**

Books for Study:

Arun K. Pujari, Data mining techniques, Universities Press, Third edition, Hyderabad, 2013.
Unit 1: Chapter 2 Section 2.1-2.6, 2.8,2.10,2.17-2.18,2.22,2.24,2,26
Unit 2: Chapter 3 Section 3.2-3.11
Unit 3: Chapter 4 Section 4.2-4.5,4.10,4.12
Unit 4: Chapter 5 Section 5.2-5.8,5.11,5.12 Chapter 6 Section 6.2-6.10
Unit 5: Chapter 11 Section 11.1-11.7, 11.10 Chapter 12 Section 12.2 – 12.4, 12.12 – 12.14

Books for References:
1. M. H. Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education, New Delhi, 2001. 2. D. Hand, H. Mannila and P. Smyth, Principles of Data Mining, Prentice-Hall, New Delhi, 2001
Web Resources:
https://www.tutorialspoint.com/dwh/index.htm **https://www.guru99.com/data-warehousing-tutorial.html** **https://www.javatpoint.com/data-mining-techniques**

Course Outcomes		**K Level**
CO1:	Determining the characteristics of Data Warehouse	**K3**
CO2:	Integrating Data Mining techniques and other related areas	**K3**
CO3:	Implementing Association Rules and various algorithms	**K3**
CO4:	compare several newer algorithms for Clustering techniques in Data Mining	**K4**
CO5:	Analyzing Web mining & Spatial Mining Techniques	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction – Data warehouse Architecture – Dimensional modelling – Categorization of hierarchies – Aggregate function – Summarisability – OLAP operations – OLAP Server – Coalescing – DWARF – Data Marting – Data Cleaning – Cloud Data Warehousing.	**15**	**PPT Chalk & Talk**
II	What is Data Mining? – Data Mining Definitions – KDD vs Data Mining – DBMS vs DM – other related areas - DM techniques – Other Mining problems – Issues and challenges in DM – DM application areas – DM applications – Case studies	**15**	**PPT**
III	What is an Association Rule – Methods to discover Association rules – Apriori algorithm – Partition algorithm – Rapid Association Rule Mining (RARM) – Incremental Algorithm – Association Rules with Item Constraints	**15**	**ICT Tools**
IV	Clustering Paradigms - Partitioning algorithms – Kmedoid Algorithms – CLARA – CLARANS – Hierarchical clustering DB scan – Categorical Clustering algorithm – STIRR. **Decision trees:** What is a Decision tree? –Tree construction principle – Best split – Splitting indices – Splitting Criteria – Decision tree construction algorithms – CART – ID3-C4.5	**15**	**Chalk & Talk&PPT**
V	Introduction – Web Mining – We content mining – Web structure mining – Web usage mining – Text Mining- Unstructured text – Text Clustering – **Temporal Data Mining:** -Temporal Data Mining and its Association Rules – Sequence Mining – Spatial Mining and its tasks – Spatial Clustering.	**15**	**ICT**

Course Designed by: **Mrs.V.Bhavani and G.Mahalakshmi, Assistant Professor**

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1.K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	K4	2	K1,K2	2	K2	2(K3,K3)	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

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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K3)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K3)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K4)**
5	CO5	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**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	4	10	-	19	15.83	16
K2	5	6	10	20	41	34.16	34
K3	-	-	30	30	60	50	50
K4	-	-	-	-	-		
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	K1	
12	CO2	K1	
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	K1	
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K2	
18) b	CO3	K2	
19) a	CO4	K3	
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**SOFTWARE PROJECT MANAGEMENT**			
Course Code	**21UCAE52**	**L**	**P**	**C**
Category	**Core**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Define the scope of software Project Management
- Understand some problems and concerns of software Project Managers
- Explain the main elements of the role of Management
- Appreciate the need for careful planning, monitoring and control
- Define the success criteria for a Project

Unit: I	**Introduction to Software Project Management**	**15hrs**

Introduction – project – software project vs other types of project-activities covered by software project management-plan,methods and methodologies – categorizing software projects-project charter-stakeholder-setting objectives- **Project Evaluation and programme Management** – Evaluation of individual projects-Cost benefit Evaluation techniques – Risk Evaluation

Unit: II	**Overview of project planning**	**15hrs**

Introduction to stepwise 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 – execute plan/lower levels of planning –**Selection of an appropriate project approach**: Choice of process models-The waterfall model-spiral model-software prototyping

Unit: III	**Software Effort Estimation**	**15hrs**

Introduction –The basics for software estimating-software effort estimation techniques – bottom up estimating-top down approach-Expert Judgement –COCOMO II:A parametric productivity Model – **Activity Planning**: Objectivities of activity planning-Project schedules-projects and activities-sequencing and scheduling activities-Network planning model

Unit: IV	**Risk Management**	**15hrs**

Risk Management Approaches- A framework for dealing with risk-Risk identification-Risk Assessment-Risk planning-Risk Management-**Resource Allocation**-Nature of resources-Identifying Resource Requirements-Scheduling Resources-Creating critical path

Unit: V	**Monitoring and Control**	**15hrs**

Creating the framework-collecting the data-Review-Visualizing progress-Cost Monitoring-Earned value Analysis-Prioritizing Monitoring-Working in Teams-Becoming a Team-Decision Making-Organization and Team Structures-**Software Quality**-The place of Software Quality in Project Planning-Importance of Software Quality-Defining Software Quality –Techniques to help enhance Software Quality

	Total Lecture Hours	**75 Hrs**

Books for Study:

Text Book: 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 References:	
1.Stellman, Andrew; Greene, Jennifer (2005). *Applied Software Project Managemen*t 2.Richard H. Thayer, Edward Yourdon . *Software Engineering ProjectManagement* *3.*Fleming, Quentin . *Earned Value Project Management* (Third Editioned.).	
Web Resources:	
http://www.google.com **http://www.tutorialspoit.com** **http://www.slideshare.com**	
Course Outcomes	**K Level**
At the end of the course, the students will be able to	
CO1: Define the scope of Software Project Management and usual stages of a software project	**K3**
CO2: Evaluate the business risk involved in a project	**K3**
CO3: Determine an appropriate process model	**K3**
CO4: Examine the resource required for a project	**K4**
CO5: Evaluate the quality of software project	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Introduction** – project – software project vs other types of project-activities covered by software project management-plan, pmethods and methodologies – categorizing software projects-project charter-stakeholder-setting objectives- **Project Evaluation and programme Management –** Evaluation of individual projects-Cost benefit Evaluation techniques – Risk Evaluation	15	**Black Board/PPT**
II	Introduction to stepwise 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 –execute plan/lower levels of planning – **Selection of an appropriate project approach**: Choice of process models-The waterfall model-spiral model-software prototyping	15	**Black Board/PPT**
III	Introduction –The basics for software estimating-software effort estimation techniques – bottom up estimating-top down approach-Expert Judgement –COCOMO II:A parametric productivity Model – **Activity Planning**: Objectivities of activity planning-Project schedules-projects and activities-sequencing and scheduling activities-Network planning model	15	**Black Board/PPT**
IV	Risk Management Approaches- A framework for dealing with risk-Risk identification-Risk Assessment-Risk planning-Risk Management-**Resource Allocation**-Nature of resources-Identifying Resource Requirements-Scheduling Resources-Creating critical path	15	**Black Board/PPT**
V	Monitoring and control - Creating the framework-collecting the data-Review-Visualizing progress-Cost Monitoring-Earned value Analysis-Prioritizing Monitoring-Working in Teams-Becoming a Team-Decision Making-Organization and Team Structures-**Software Quality**-The place of Software Quality in Project Planning-Importance of Software Quality-Defining Software Quality –Techniques to help enhance Software Quality	15	**Black Board/PPT**

Course Designed by: M.Ramesh Kumar & R.Vasuki Assistant Professor

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1.K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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

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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	100	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K2)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K2&K2)**	**1(K2)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
5	CO5	**K4**	**2**	**K1,K2**	**1**	**K1,K2**	**2(K3&K3)**	**1(K3)**
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	4	10	-	19	15.83	16
K2	5	6	10	20	41	34.16	34
K3	-	-	30	30	60	50	50
K4	-	-	-	-	-		
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	K1	
12	CO2	K1	
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	K2	
22	CO2	K3	
23	CO3	K2	
24	CO4	K3	
25	CO5	K3	

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

Course Name	**INTERNET OF THINGS**			
Course Code	**21UCAE53**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	EMPLOYABILITY		**SKILL ORIENTED**	✓	ENTREPRENURSHIP	

Course Objectives:

- To describe what IoT is and how it works today
- To understand the application areas of IOT
- To understand building blocks of Internet of Things and characteristics
- To realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks ·
- To design and program IoT device

Unit: I	**Introduction to Internet of Things**	**15**

Introduction - Physical Design of IoT- logical Design of IoT- IoT Enabling Technologies-IoT Levels & Deployment Templates

Unit: II	**IoT Physical Devices & Endpoints**	**15**

What is an IoT Device- Basic building blocks of an IoT Device.**Domain Specific IoTs:**Introduction – Home Automation- Cities–Environment–Energy– Retail-Logistics-Agriculture-Industry-Health & Lifecyce

Unit: III	**IoT and M2M**	**17**

Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT.**IoT System Management with NETCONF-YANG** :Need for IoT Systems Management – Simple Network Management Protocol (SNMP) – Network Operator Requirements – NETCONF – YANG –IoT Systems Management with NETCONF – YANG

Unit: IV	**IoT Platforms Design Methodology**	**13**

Introduction - IoT Design Methodology – Purpose & Requirements Specification – Process Specification – Domain Model Specification – Information Model Specification – Service Specifications – IoT Level Specification – Functional View Specifications – Operational View Specification – Device & Component Integration – Application Development.

Unit: V	**Data Analytics for IoT**	**15**

Introduction-Apache Hadoop-Using Hadoop MapReduce for Batch Data Analysis-Apache Oozie-Apache Spark-Apache Storm

	Total Lecture Hours	**75Hrs**

Books for Study:

1. ArshdeepBahga , Vijay Madisetti, "Internet of Things - A Hands on Approach", University Press (India)Private Limited, New Delhi,2014

Unit I : Chapter 1: 1.1-1.5
Unit II : Chapter:7:7.1, Chapter 2:2.1-2-10
Unit III: Chapter 3 : 3.1 – 3.4-Chapter 4:4.1 – 4.6
Unit IV: Chapter 5-5.1 ,5.2
Unit V : Chapter 10-10.1-10.6

Books for References:

4. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David

Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
5. Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, A Press Publications, 2013.
6. RajKamal,"Internet of Things Architecture and Design Principles", McGraw Hill,Fourth Edition, 2019.

Web Resources:

1.https://www.guru99.com/iot-tutorial.html
2.https://www.edureka.co/blog/iot-tutorial/
3.https://youtube.com/watch?v=h0gWfVCSGQQ

Course Outcomes		K Level
At the end of the course, the students will be able to		
CO1:	Determine the IoT networking components with respect to OSI layer	**K3**
CO2:	Discover about IoT applications and various sensors	**K3**
CO3:	Illustrate the IoT protocols and software	**K3**
CO4:	Classify the IoT design methodology and its components	**K4**
CO5:	Distinguish about various data analyticsin IoT	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Introduction to Internet of things**: Introduction - Physical Design of IoT logical Design of IoT- IoT Enabling Technologies-IoT Levels & Deployment Templates: IoT Level 1- IoT Level 2- IoT Level 3- IoT Level 4- IoT Level-5 IoT Level -6.	**15**	Chalk & Talk, ICT Kit
II	**IoT physical devices and endpoints blocks of an IoT Device:** What is an IoT device- Basic building blocks of an IoT Device **Domain Specific IoTs:** Introduction – Home Automation- Cities–Environment –Energy – Retail- Logistics-Agriculture.	**15**	Chalk & Talk, ICT Kit
III	**IoT and M2M:** Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT.**IoT System Management with NETCONF**: YANG – Need for IoT Systems Management – Simple Network Management Protocol (SNMP) – Limitations of SNMP – Network Operator Requirements – NETCONF – YANG –IoT Systems Management with NETCONF – YANG.	**17**	Chalk & Talk, ICT Kit
IV	**IoT Platforms Design Methodology**: Introduction - IoT Design Methodology – Introduction – IoT Design Methodology – Purpose and Requirements Specification – Process Specification – Domain Model Specification – Information Model Specification – Service Specifications – IoT Level Specification – Functional View Specifications – Operational View Specifications – Device & Component Integration – Application Development.	**13**	Chalk & Talk, ICT Kit
V	**Data Analytics for IoT:** Introduction-Apache Hadoop-Using Hadoop MapReduce for Batch Data Analysis-Apache Oozie-Apache Spark-Apache Storm.	**15**	Chalk & Talk, ICT Kit

Course Designed by: Mrs.R.Vasuki & 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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K - Level	No. of. Questions	K - Level		
CI AI	CO1	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	K5	-	-	-	-	-	-	-
	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	CO1	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	**K4**	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	**K4**	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
No. of Questions to be Asked			**10**	**K1,K2**	**5**	**K2**	**10**	**5**
No.of Questions to be answered			**10**	**K1,K2**	**5**	**K2**	**5**	**3**
Marks for each question			**1**	**K1,K2**	**2**	**K2**	**5**	**10**
Total Marks for each section			**10**	**K1,K2**	**10**	**K2**	**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	30	60	50	50
K4	-	-	20	20	40	34	34
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	K1	
12	CO2	K1	
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**CLOUD COMPUTING**			
Course Code	**21UCAE54**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Identify the technical foundations of cloud systems architectures.
- Analyze the problems and solutions to cloud application problems.
- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance.
- To offer skills, knowledge to understand technology for storing, analyzing and handling large amounts of data efficiently.

Unit: I	**Define cloud Computing**	**15**

Defining Cloud Computing – Cloud types –The NIST model, the cloudcube model, Deployment models, Service models, Characteristics of cloud computing- Benefits of Cloud Computing- Disadvantages of cloud computing.

Unit: II	**Understanding Cloud Architecture**	**20**

Cloud computing stack: compos ability – Infrastructure – platforms - Virtual appliances - Communicationprotocols–Applications. Understanding Services and Applications by Type: Defining IaaS(Infrastructure as a Service) – Defining Platform as a Service(PaaS) – Defining Software as a Service(SaaS) – Defining Identity as a Service(IDaas) – Defining Compliance as a Service(CaaS)

Unit: III	**Understanding Abstraction and Virtualization**	**10**

Using Virtualization Techniques – Loadbalancing and Virtualization – Understanding Hypervisors – Porting Applications-**Exploring Platform as a Service**: Defining services - Using PAAS application frameworks.

Unit: IV	**Using Google Web services**	**15**

Exploring Google Applications – Surveying the Google Application Portfolio – Exploring the Google Toolkit – Working with the Google App Engine.**Understanding Cloud Security:** Securing the Cloud- Securing Data – Establishing Identity andPresence .

Unit: V	**Moving Applications to the Cloud**	**15**

Applications in the Clouds – Applications and cloud APIs. **Using Amazon Web services:** Understanding Amazon Web Services - Amazon Web Service Components and Services - Working with the Elastic Compute Cloud -(EC2) - Understanding Amazon Database Services - Amazon SimpleDB .- Amazon Relational Database Service (RDS)- Choosing a database for AWS .

	Total Lecture Hours	**75 Hrs**

Books for Study:

1. Barrie Sosinsky, “Cloud Computing Bible”,Wiley, India 2014.

Unit 1: Chapter 1
Unit 2: Chapter 3, 4
Unit 3: Chapter 5,7

Unit 4: Chapter 8,12 Unit 5: Chapter 9,14
Books for References:
1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing:Principles and Paradigms", Wile, 2011. 2. Antony T Velte, "Cloud Computing: A Practical Approach", McGraw Hill, 2009.
Web Resources:
1. https://www.citrix.com › en-in › glossary › what-is-cloud-computing **2. https://data-flair.training › Blog Home › Cloud Computing Tutorials** **3. https://www.tutorialspoint.com › cloud_computing**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Illustrate Cloud Computing and its Model	**K3**
CO2:	Demonstrate Cloud Architecture and Services and Applications by Type	**K3**
CO3:	Construct Cloud Architecture and Exploring Platform as a Service	**K3**
CO4:	Analyze Google web services and understanding cloud security	**K4**
CO5:	Examine application to the cloud and understanding amazon web services.	**K4**

CO & PO Mapping:

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**	**3**	**2**	**2**	**2**
CO 3	**3**	**2**	**2**	**3**	**2**	**2**
CO 4	**2**	**3**	**2**	**2**	**2**	**2**
CO 5	**2**	**2**	**2**	**2**	**3**	**3**

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Defining Cloud Computing – Cloud types –The NIST model, the cloud cube model, Deployment models, Service models, Characteristics of cloud computing- Benefits of Cloud Computing-Disadvantages of cloud computing.	15	PPT / CHALK & TALK
II	Cloud computing stack: compos ability – Infrastructure – platforms - Virtual appliances – Communication protocols–Applications. Understanding Services and Applications by Type: Defining IaaS(Infrastructure as a Service) – Defining Platform as a Service (PaaS) – Defining Software as a Service (SaaS) – Defining Identity as a Service(IDaas) – Defining Compliance as a Service (CaaS).	20	PPT / CHALK & TALK
III	Using Virtualization Techniques – Loadbalancing and Virtualization – Understanding Hypervisors – Porting Applications-**Exploring Platform as a Service**: Defining services - Using PAAS application frameworks.	10	PPT / CHALK & TALK
IV	Exploring Google Applications – Surveying the Google Application Portfolio – Exploring the Google Toolkit – Working with the Google App Engine. **Understanding Cloud Security:** Securing the Cloud-Securing Data – Establishing Identity andPresence .	15	PPT / CHALK & TALK
V	Applications in the Clouds – Applications and cloud APIs. **Using Amazon Web services:** Understanding Amazon Web Services - Amazon Web Service Components and Services - Working with the Elastic Compute Cloud -(EC2) - Understanding Amazon Database Services - Amazon SimpleDB .- Amazon Relational Database Service (RDS)- Choosing a database for AWS .	15	PPT / CHALK & TALK

Course Designed by: Mrs.G.Mahalakshmi & V.Bhavani Assistant Professor

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**MANAGEMENT INFORMATION SYSTEMS**			
Course Code	**21UCAE55**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- Introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- Enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive. .
- Enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- Provide the theoretical models used in database management systems to answer business questions.

Unit: I	Management Information System in a Digital Firm	**15**

Management Information System (MIS): Concept-MIS: Definition-Role of the Management Information System – Impact of the Management Information System-MIS and User- Management as a Control System- MIS: A support to the Management – Management Effectiveness and MIS – Organisation as a System – MIS: Organisation as a System – MIS for a Digital Firm.**Creating a model of Organization Excellence:Essentially** of Strategic Planning - Tools of planning -Balance Score card , Score card and Dash Board - Strategic Management of business Performance - Three approaches to Development Strategy - Class and types of Strategy.

Unit: II	Decision-Making and Information, Knowledge,Business Intelligence	**15**

Decision- making Concepts – Decision-Making Process- Decision Analysis by Analytical Modeling- Behavioural Concepts Decision-Making – Organisational Decisional-Making-MIS and Decision-Making. **Information, Knowledge,Business Intelligence:** Information Concepts - Information : A Quality Product - Classification of the information - Methods od data and information collection - Value of the information - General model of a Human as an Information Processor.

Unit: III	Systems Engineering: Analysis and Design	**15**

System Concepts- -Types of System – General model of MIS - Need for system analysis - System analysis of the existing system - System analysis of a new requirements - System Development Model - Structured System Analysis and Design(SSAD) - Object Oriented Analysis(OOA).**Development Process of MIS**: Development of Long Plans of the MIS- Ascertaining the Class of Information- Determining the Information Requirement – Development and Implementation of the MIS- Management Information Quality in the MIS-Oraganisation for Development of MIS- MIS: Development Process Model

Unit: IV	Business Intelligence for MIS	**15**
Business Intelligence and MIS – What is Business Intelligence (BI)?-Tools and Techniques of BI-Why is BI Developed - How is BI Used?- Process of Generation of BI –MIS and Business Intelligence. **Decision Support Systems and Knowledge Management**: Decision Support Systems(DSS):Concept and Philosophy- DSS Models: Behavioural, Management Science and Operations Research Models- Group Decision Support System(GDSS)- Artificial Intelligence(AI) System- Knowledge based Expert System(KBES) – DSS Application in E-enterprise- MIS and Benefits of DSS		
Unit: V	Technology of Information System	**15**
Introduction-Data Processing –Transaction Processing-Application Processing-Information System Processing OLAP for Analytical Information-TQM of Information System .**Data Warehouse**: Architecture to Implementation: Introduction-Data in Data Warehouse- Architecture of Data Warehouse-Data Warehouse Design-Organisation and Management of Data Warehouse-Implementation of Data Warehouse – Business Intelligence-Data Warehouse and MIS.		
	Total Lecture Hours	**75 Hrs**

Books for Study:

1. Waman S Jawadekar "Management Information System" A Global Digital Enterprise Systems McGRaw Hill Education(India) Private Limited,Fifth Edition 2017

Unit I: Chapter 1 – 1.1 to1.11
Chapter 3: 3.1-3.7
Unit II: Chapter 6 : 6.1 to 6.6
Chapter 7: 7.1 to7.6
Unit III: Chapter 8 : 8.1 to 8.12
Chapter 9: 9.1- 9.7
Unit IV: Chapter 11 – 11.1-11.6 ,11.9
Chapter 14 – 14.1 – 14.7
Unit V: Chapter 16 -16.1 – 16.7
Chapter 19 – 19.1-19.9

Books for References:

1.Kenneth C. Laudon and Jane P. Laudon: Management Information System, Managing the Digital Firm, Pearson Education, 14th Global edition, 2016, ISBN:9781292094007.
2 James A. O' Brien, George M. Marakas: Management Information Systems, Global McGraw Hill, 10th Edition, 2011, ISBN: 978-0072823110.
3. Steven Alter: Information Systems The Foundation of E-Business, Pearson Education, 4thEdition, 2002

Web Resources:

1.https://onlinecourses.nptel.ac.in/noc20_mg60/preview
2.https://onlinecourses.swayam2.ac.in/cec21_ge05/preview
3.https://www.guru99.com/mis-tutorial.html

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Examining a Management Information system in a digital form and model of organization.	**K3**
CO2:	Preparing Decision making and Information Concepts	**K3**
CO3:	Implementing System Engineering and Development Process	**K3**
CO4:	Structuring the Business Intelligence and Decision Support system	**K4**
CO5:	Explaining Technology of Information System and Data Warehouse	**K4**

CO & PO Mapping:

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	3	2	2	2
CO 3	3	2	2	3	2	2
CO 4	2	3	2	2	2	2
CO 5	2	2	2	2	3	3

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Management Information System (MIS): Concept-MIS: Definition-Role of the Management Information System – Impact of the Management Information System-MIS and User- Management as a Control System-MIS: A support to the Management – Management Effectiveness and MIS – Organisation as a System – MIS: Organisation as a System – MIS for a Digital Firm.**Creating a model of Organization Excellence:Essentially** of Strategic Planning - Tools of planning - Balance Score card , Score card and Dash Board - Strategic Management of business Performance - Three approaches to Development Strategy - Class and types of Strategy.	**15**	PPT / CHALK & TALK
II	Decision- making Concepts – Decision-Making Process- Decision Analysis by Analytical Modeling- Behavioural Concepts Decision-Making – Organisational Decisional-Making - MIS and Decision-Making. **Information, Knowledge,Business Intelligence:** Information Concepts - Information : A Quality Product - Classification of the information - Methods od data and information collection - Value of the information - General model of a Human as an Information Processor.	**15**	PPT / CHALK & TALK
III	System Concepts- -Types of System – General model of MIS - Need for system analysis - System analysis of the existing system - System analysis of a new requirements - System Development Model - Structured System Analysis and Design(SSAD) - Object Oriented Analysis(OOA).**Development Process of MIS**: Development of Long Plans of the MIS-Ascertaining the Class of Information- Determining the Information Requirement – Development and Implementation of the MIS- Management Information Quality in the MIS-Oraganisation for Development of MIS- MIS: Development Process Model.	**15**	PPT / CHALK & TALK
IV	Business Intelligence and MIS – What is Business Intelligence (BI)?- Tools and Techniques of BI-Why is BI Developed - How is BI Used?-		PPT / CHALK & TALK

	Process of Generation of BI –MIS and Business Intelligence. **Decision Support Systems and Knowledge Management**: Decision Support Systems(DSS):Concept and Philosophy- DSS Models: Behavioural, Management Science and Operations Research Models- Group Decision Support System(GDSS)- Artificial Intelligence(AI) System-Knowledge based Expert System(KBES) – DSS Application in E-enterprise- MIS and Benefits of DSS.	**15**	
V	Introduction-Data Processing –Transaction Processing-Application Processing-Information System Processing OLAP for Analytical Information-TQM of Information System .**Data Warehouse**: Architecture to Implementation: Introduction-Data in Data Warehouse-Architecture of Data Warehouse-Data Warehouse Design-Organisation and Management of Data Warehouse-Implementation of Data Warehouse – Business Intelligence-Data Warehouse and MIS.	**15**	PPT / CHALK & TALK

Course Designed by: Mrs.G.Mahalakshmi & V.Bhavani

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**ARTIFICIAL INTELLIGENCE**							
Course Code	**21UCAE56**					**L**	**P**	**C**
Category	**Core**					5	-	5
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**			✓

Course Objectives :

- Describe the concept of Artificial Intelligence
- Analyze the search techniques and knowledge representation
- Demonstrate knowledge of the building models of AI as presented in terms of intelligent agents.
- Learn the purpose of heuristic search techniques.
- Examine the issues involved in knowledge bases, reasoning systems and planning

Unit: I	**Introduction to Artificial Intelligence and Problems Spaces and Search**	**15hrs**

The AI problems - The underlying Assumptions – What is an AI technique? - The Level of the Model – Criteria for Success, **Problems, Problems Spaces and Search :** Defining the Problem as a State Space Search – Production Systems, Problem Characteristics, Production System Characteristics, Issue in the Design of Search Programs.

Unit: II	**Heuristic Search Techniques:**	**15hrs**

Heuristic Search Techniques: Generate and Test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, and Means – Ends Analysis.

Unit: III	**Knowledge Representation Issues :**	**15hrs**

Knowledge Representation Issues : Representation and Mappings – Approaches to Knowledge Representation, Issues in Knowledge Representation – The Frame Problem – **Using Predicate Logic :** Representing Simple Facts in Logic - Representation Instance and ISA Relationships, Computable Functions and Predicates – Resolution – Natural Deduction

Unit: IV	**Representing knowledge using Rules:**	**15hrs**

Representing knowledge using Rules: Procedural Versus Declarative Knowledge, Logic Programming, and Forward Versus Backward Reasoning – Matching- Control Knowledge.

Unit: V	**Symbolic Reasoning Under Uncertainty:**	**15hrs**

Symbolic Reasoning Under Uncertainty: Introduction to Nonmonotonic Reasoning – Logic for Nonmonotonic Reasoning – Implementation Issues – Augmenting Problem Solver Implementation of DFS – Breadth – First Search

	Total Lecture Hours	**75 Hrs**

Books for Study:

1.Stuart J.Russell ,Peter Norvig "Artificial Intelligence A modern approach" Third edition, Pearson Education India
Unit I: Chapter 1: 1.1 - 1.4, 2: 2.1,2.3,2.4
Unit II: Chapter 3: 3.1, 3.3-3.5, 5: 5.1,5.2,5.3
Unit III: Chapter 7: 7.1-7.4,7.7, 18:18.1 -18.2
Unit IV: Chapter 21:21.1-21.3 ,22:22.1-22.4
Unit V: Chapter 25:25.1-25.8

Books for References:		
1. Christopher M. Bishop. Pattern Recognition and Machine Learning (Springer) 2. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Prentice Hall of India		
Web Resources:		
https://www.tutorialspoint.com/dwh/index.htm **https://www.guru99.com/data-warehousing-tutorial.html** **https://www.javatpoint.com/data-mining-techniques**		
Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Determining Artificial Intelligence (AI) fundamentals and Agents.	**K3**
CO2:	Examining the basic principles of AI solutions that require in problem solving, inference perception, knowledge representation, and learning	**K3**
CO3:	Implementing different searching algorithms for AI programming techniques	**K3**
CO4:	Structuring basic ANN and different optimizations techniques	**K4**
CO5:	To analyze Nonmonotonic Reasoning Augmenting Problem	**K4**

CO & PO Mapping:

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**	**3**	**2**	**2**	**2**
CO 3	**3**	**2**	**2**	**3**	**2**	**2**
CO 4	**2**	**3**	**2**	**2**	**2**	**2**
CO 5	**2**	**2**	**2**	**2**	**3**	**3**

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	The AI problems - The underlying Assumptions – What is an AI technique? - The Level of the Model – Criteria for Success, **Problems, Problems Spaces and Search :** Defining the Problem as a State Space Search – Production Systems, Problem Characteristics, Production System Characteristics, Issue in the Design of Search Programs.	15	PPT,Chalk & Talk
II	**Heuristic Search Techniques:** Generate and Test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, and Means – Ends Analysis.	15	PPT,Chalk & Talk
III	**Knowledge Representation Issues :** Representation and Mappings – Approaches to Knowledge Representation, Issues in Knowledge Representation – The Frame Problem – **Using Predicate Logic :** Representing Simple Facts in Logic - Representation Instance and ISA Relationships, Computable Functions and Predicates – Resolution – Natural Deduction	15	ICT Tools
IV	**Representing knowledge using Rules:** Procedural Versus Declarative Knowledge, Logic Programming, and Forward Versus Backward Reasoning – Matching- Control Knowledge.	15	PPT,Chalk & Talk
V	**Symbolic Reasoning Under Uncertainty:** Introduction to Nonmonotonic Reasoning – Logic for Nonmonotonic Reasoning – Implementation Issues – Augmenting Problem Solver Implementation of DFS – Breadth – First Search	15	ICT

Course Designed by: MrsV. Bhavani

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**DATA MINING LAB**			
Course Code	**21UCASP5**	**L**	**P**	**C**
Category	**Skill**	2	-	2

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Install data mining tools and get hands on experience in that tool.
- Apply and analyze Data Mining Algorithms to handle larger set of databases.
- Examine the use of PHP programming that uses SQL tables.
- Examine to extract huge sets of data using OLAP operations.
- Able to analyze and classify web documents using Web mining techniques.

S.No	List of Programs	Hrs
1	Listing applications for mining	
2	Conversion of various data files	
3	Training the given dataset for an application	
4	Testing the given dataset for an application	**30hrs**
5	Data pre-processing – data filters	
6	Feature selecting	
7	Text mining	
8	Web mining	
	Total Lecture Hours	**30 Hrs**

Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)

1. **https://www.w3schools.com/DataMining tools/**
2. **https://www.tutorialsteacher.com/DataMining**
3. **https://www.mygreatlearning.com/DataMining-tutorial**

Course Outcomes		K Level
CO1:	Determining data mining tools	**K3**
CO2:	Sketching Decision Tree for real time data	**K3**
CO3:	Examining Apriori Algorithm for larger datasets	**K3**
CO4:	Implementing OLAP operations	**K4**
CO5:	Structuring a small data mining project with real time dataset	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
1	Listing applications for mining	30	Laboratory experiments
2	Conversion of various data files		
3	Training the given dataset for an application		
4	Testing the given dataset for an application		
5	Data pre-processing – data filters		
6	Feature selecting		
7	Text mining		
8	Web mining		

Course Designed by: **Mrs.V.Bhavani, Assistant Professor**


SIXTH SEMESTER

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

Course Name	**C# and .NET PROGRAMMING**			
Course Code	**21UCAC61**	**L**	**P**	**C**
Category	**CORE**	6	-	4

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- To Highlighting Knowledge of Object- oriented paradigm in the C# Program Language and to Gathering knowledge of .NET environments.
- To design and develop console and window-based .NET Application.
- Demonstrate the usage of recent platforms like C#, XML, and ASP.Net which is used in the development of web application
- Represent the security in the .NET framework.
- To practice the fundamental programming mythologies in the C# programming via laboratory experiences.

Unit: I	**Introducing C# , Literals, Variables and Data types**	**18hrs**

Evolution of C# - Characteristics – Applications – C# Differ from C++, Java - – **Understanding .NET:** The C# Environment – .NET Strategy, Origin, .NET Framework – Common Language Runtime – Framework Base Classes – User and Programme Interfaces – Visual Studio .NET, .NET Languages, Benefits. **Overview of C# -** Introduction, Simple C# Program, Namespaces, Adding Comments, Main Returning a value, Command Line Arguments, Main with a Class – Providing Interface Input – Using Mathematical functions – Compile Time Errors – Program Structure – Program Coding Style. **Literals, Variables and Data types –** Introduction – Literals – Variables, Data Types, Value Types, Reference Types, Declaration and initialization of variables, Default Values, Constant Variables, Scope of variables, Boxing and Unboxing.

Unit: II	**Operations and Expressions, Decision Making and Branching and Looping**	**18hrs**

Introduction –Arithmetic Operations – Relational Operators – Logical Operators – Assignment Operators, Increment and Decrement operators, Conditional Operators, Bitwise operators, Special Operators, Arithmetic Expressions, Evaluation and Expressions, Type Conversions Mathematical Functions. **Decision Making and Branching – Introduction –** Decision Making with if Statement – Simple if Statement - if…else statement, Nesting of if…else statement, else…if ladder, Switch statement,?: operators- **Decision Making and Looping – Introduction –** while statement – do statement- for statement – for each statement – jump in loops.

Unit: III	**Methods in C# , Handling Arrays and Manipulating Strings**	**18hrs**

Introduction- Declaring methods – Main Methods – Invoking and Nesting of methods – Method parameters – pass by value and reference – output parameters – variable argument lists – method overloading, **Handling Arrays – Introduction –** One Dimensional Arrays – Creating an Array – Two Dimensional Arrays – Variable Size Arrays – System Array Class – Array List Class, **Manipulating Strings** - Creating Strings, String Methods, Inserting Strings, Comparing Strings, Finding Substrings, Mutable Strings, Array of Strings, Regular Expressions

Unit: IV	**Classes and Objects, Inheritance and Polymorphism**	**18hrs**

Introduction- Basic Principles of OOPs – Defining a Class, adding variables, Methods, Member

Access Modifiers, Creating Objects, Accessing Class Members, Constructors, overloaded constructors, Static Members and Constructors, Private Constructors, Copy Constructors, Destructors, member initialization, This reference- Nesting of Classes, Constant members, Read-only members, properties, Indexes. **Inheritance and Polymorphism** - classical, containment, Defining a subclass, visibility control, defining subclass constructors, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Hiding methods, Abstract Classes& Methods, Sealed Classes and Preventing inheritance, sealed methods, polymorphism, Extensive Methods .		
Unit: V	**Interfaces, Operator Overloading, Delegates and Events**	**18**
Defining an Interface **–** Extending an Interface – Implementing Interfaces, interfaces and inheritance, Explicit interface implementations, Abstract Class and interfaces, **Operator Overloading -** Operators, Need for operator overloading, Defining Operator overloading, overloading unary operators, overloading binary operators, overloading Comparing operators, **Delegates and Events –** Delegates – Declaration and methods – Delegate Instantiation- Delegate invocation – using Delegates – multicast Delegates – Events, **Managing Console IO operations –** Console Class, Console input, Console output, formatted output, Numeric formatting, Standard Numeric Format, Custom Numeric Format .		
	Total Lecture Hours	**90 Hrs**

Books for Study:

1. **Balagurusamy .E ,Programming in C # , Tata McGraw Hill, New Delhi, Fourth Edition, 2004.**
   UNIT I: Chapters 1.1 – 1.7, 2.1 – 2.9, 3.1 – 3.15,4.1 – 4.12
   UNIT II: Chapters 5.1 – 5.15,6.1 - 6.8, 7.1 – 7.6
   UNIT III: Chapters 8.1 – 8.11,9.1 – 9.7, 10.1 – 10.9
   UNIT IV: Chapters 12.1 – 12.22, 13.1 – 13.16
   UNIT V: Chapters 14.1 – 14.7, 15.1 – 15.7, 16.1 – 16.9-17.1 – 17.8

Books for References:

1. Rober Powell, Richard Weeks, C# and .NET Framework, Tech Media Publication, NewDelhi,2008.
2. Jon Skeet , C# in depth, Manning Version, Fourth Edition, 2019
3. YashavantKanetkar, Let Us C, BPB Publications, New Delhi, Tenth Edition, 2010.
4. Byron Gottfried, Programming with C, McGraw Hill Education (India) Private Limited, New Delhi,Third Edition,2014.

Web Resources:

1. **https://www.tutorialspoint.com/csharp/index.htm**
2. **https://www.javatpoint.com/c-sharp-tutorial**
3. **https://www.udemy.com/course/c-net-for-beginners/**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Examining the programming framework in C#	**K3**
CO2:	Experimenting the programming language concepts	**K3**
CO3:	Implementing OOPS concepts in all relevant areas & development	**K3**
CO4:	Illustrating Inheritance and polymorphism	**K4**
CO5:	Develop a new project in team and as a individual member.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	-Evolution of C# - Characteristics – Applications – C# Differ from C++, Java - – **Understanding .NET:** The C# Environment – .NET Strategy, Origin, .NET Framework – Common Language Runtime – Framework Base Classes – User and Programme Interfaces – Visual Studio .NET, .NET Languages, Benefits. **Overview of C# -** Introduction, Simple C# Program, Namespaces, Adding Comments, Main Returning a value, Command Line Arguments, Main with a Class – Providing Interface Input – Using Mathematical functions – Compile Time Errors – Program Structure – Program Coding Style. **Literals, Variables and Data types –** Introduction – Literals – Variables, Data Types, Value Types, Reference Types, Declaration and initialization of variables, Default Values, Constant Variables, Scope of variables, Boxing and Unboxing	18	Chalk & Talk
II	Arithmetic Operations – Relational Operators – Logical Operators – Assignment Operators, Increment and Decrement operators, Conditional Operators, Bitwise operators, Special Operators, Arithmetic Expressions, Evaluation and Expressions, Type Conversions Mathematical Functions. **Decision Making and Branching – Introduction –** Decision Making with if Statement – Simple if Statement - if…else statement, Nesting of if…else statement, else…if ladder, Switch statement,?: operators- **Decision Making and Looping – Introduction –** while statement – do statement- for statement – for each statement – jump in loops.	18	ICT
III	Introduction- Declaring methods – Main Methods – Invoking and Nesting of methods – Method parameters – pass by value and reference – output parameters – variable argument lists – method overloading, **Handling Arrays – Introduction –** One Dimensional Arrays – Creating an Array – Two Dimensional Arrays – Variable Size Arrays – System Array Class – Array List Class, **Manipulating Strings** - Creating Strings, String Methods, Inserting Strings, Comparing Strings, Finding Substrings, Mutable Strings, Array of Strings, Regular Expressions	18	ICT

IV	Basic Principles of OOPs – Defining a Class, adding variables, Methods, Member Access Modifiers, Creating Objects, Accessing Class Members, Constructors, overloaded constructors, Static Members and Constructors, Private Constructors, Copy Constructors, Destructors, member initialization, This reference- Nesting of Classes, Constant members, Read-only members, properties, Indexes. **Inheritance and Polymorphism** - classical, containment, Defining a subclass, visibility control, defining subclass constructors, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Hiding methods, Abstract Classes& Methods, Sealed Classes and Preventing inheritance, sealed methods, polymorphism, Extensive Methods.	**18**	**Chalk & Talk**
V	Defining an Interface **–** Extending an Interface – Implementing Interfaces, interfaces and inheritance, Explicit interface implementations, Abstract Class and interfaces, **Operator Overloading -** Operators, Need for operator overloading, Defining Operator overloading, overloading unary operators, overloading binary operators, overloading Comparing operators, **Delegates and Events –** Delegates – Declaration and methods – Delegate Instantiation- Delegate invocation – using Delegates – multicast Delegates – Events, **Managing Console IO operations –** Console Class, Console input, Console output, formatted output, Numeric formatting, Standard Numeric Format, Custom Numeric Format .	**18**	**Chalk & Talk**

Course Designed by: **Mrs.V.Bhavani, Assistant Professor**

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**C# and .NET PROGRAMMING LAB**			
Course Code	**21UCACP6**	**L**	**P**	**C**
Category	**CORE LAB**	-	6	4

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Making student understand the concept of framework.
- To develop logics this will help them to create programs, applications in Net Framework.
- To create a simple application through framework and its native Language.
- To understand the Programming concepts in .Net Framework and create website using .Net Controls.
- Design and develop dynamic, database using .Net.

S.No	List of Programs	Hrs
1	C# Program to Display Numbers in the form of Triangle	90
2	C# Program to Get a Number and Display the Sum of the Digits	
3	C# Program to Search an Element in an Array	
4	C# Program to Demonstrate Boxing and Unboxing Operations	
5	C# Program to Combine Two Delegates	
6	C# Program to Demonstrate Multilevel Inheritance	
7	C# Program to Illustrate Hierarchical Inheritance	
8	C# Program to Demonstrate Multiple Exceptions	
9	C# program to convert a temperature from Celsius to Fahrenheit	
10	C# program to design a simple calculator.	
11	C# Program to Generate the Mark sheet of the Student	
12	Create a windows form with the following controls Textbox, Radio button, Check box, Command Button	
13	Create a program to perform validation using validation controls.	
14	Write a program to store the employee details using class and methods in C# .NET	
15	Create a program to connect with database and manipulate the records in the database using ADO .NET	
	Total Lecture Hours	**90 Hrs**

Web Resourse:

1. https://www.tutorialspoint.com/csharp/index.htm
2. https://www.javatpoint.com/c-sharp-tutorial
3. https://www.udemy.com/course/c-net-for-beginners/

Course Outcomes		**K Level**
CO1:	Understand code solutions and compile C# projects within the .NET framework.	**K3**
CO2:	Design and develop professional console and window based .NET application.	**K3**
CO3:	Implement string manipulation, events and exception handling within .NET application environment.	**K3**
CO4:	Design and Implement database connectivity using ADO.NET in window based application.	**K4**

CO5:	Develop professional console and window based .NET application.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
1	C# Program to Display Numbers in the form of Triangle	**90**	**Laboratory experiments**
2	C# Program to Get a Number and Display the Sum of the Digits		
3	C# Program to Search an Element in an Array		
4	C# Program to Demonstrate Boxing and Un boxing Operations		
5	C# Program to Combine Two Delegates		
6	C# Program to Demonstrate Multilevel Inheritance		
7	C# Program to Illustrate Hierarchical Inheritance		
8	C# Program to Demonstrate Multiple Exceptions		
9	C# program to convert a temperature from Celsius to Fahrenheit		
10	C# program to design a simple calculator.		
11	C# Program to Generate the Mark sheet of the Student		
12	Create a windows form with the following controls Textbox, Radio button, Check box, Command Button		
13	Create a program to perform validation using validation controls.		
14	Write a program to store the employee details using class and methods in C# .NET		
15	Create a program to connect with database and manipulate the records in the database using ADO .NET		

Course Designed by Mrs V.Bhavani & Mrs R.Vasuki Assistant Professor

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

Course Name	**PROJECT AND VIVA - VOCE**				
Course Code	**21UCAPR1**		**L**	**P**	**C**
Core	**PRACTICAL**		-	6	4
NATURE OF COURSE:	**EMPLOYABILITY**	**SKILL ORIENTED**	ENTREPRENURSHIP		

COURSE OBJECTIVES:

- To acquire the knowledge about selecting the task based on their course skills.
- To get the knowledge about analytical skill for solving the selected task
- To get confidence by implementing the task in a real time projects.
- To Facilitates experiential learning.
- 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 Hrs**
	Total Lecture Hours	**90 Hrs**

Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)

1. **http://www.google.com**
2. **http://www.w3schools.com**
3. **http://codeguru.com**

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**
5. **https://spoken-tutorial.org/tutorial-search/?search_foss=Python+3.4.3&search_language=English**

EXPECTED COURSE OUTCOME		**K Level**
CO1:	Examine programming skill for solving the project	**K3**
CO2:	Group the task and to collect the necessary information and software	**K3**
CO3:	Develop and Testing the task based on the software.	**K3**
CO4:	Analyze the software for getting the Report.	**K4**
CO5:	Evaluating all the Modules and Preparing complete Documentation	**K4**

CO & PO Mappings:

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

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

LESSON PLAN

Module	Project And Viva Voce	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 Mr M.Ramesh Kumar & Mrs R.Vasuki

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

Course Name	**CYBER SECURITY**			
Course Code	**21UCAE61**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- To understand key terms and concepts in Cryptography, Governance and Compliance
- To diagnose and investigate cyber security events or crimes related to computer systems and digital evidence.
- To exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an organization.
- To implement Cyber security Best Practices and Risk Management
- To practice with an expertise in academics to design and implement security solutions.

Unit: I	**Cyber Security Fundamentals**	**15**

Network and Security Concepts - Information Assurance Fundamentals - Basic Cryptography - Symmetric Encryption - Public Key Encryption -The Domain Name System(DNS)-Firewalls

Unit: II	**Attacker Techniques and Motivations**	**15**

How Hackers Cover Their Tracks(Anti forensics)-Tunneling Techniques-Fraud Techniques-Rogue Antivirus-Click Fraud-Threat Infrastructure

Unit: III	**Exploitation**	**17**

Format String Vulnerabilities-SQL Injection– Protecting against SQL injection- Malicious PDF Files-PDF File Format-Creating Malicious PDF Files-Reducing the risks of Malicious PDF Files-Race conditions – Brute Force and Dictionary Attacks

Unit: IV	**Malicious Code**	**13**

Self-Replicating Malicious Code-Rootkits-Spyware-Token Kidnapping- Stealing formation and Exploitation-Form Grabbing-Man-in-the-Middle Attacks–DLL Injection

Unit: V	**Defense and Analysis Techniques**	**15**

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 – Automated Malicious Code Analysis Systems-Passive Analysis-Active Analysis

	Total Lecture Hours	**75 Hrs**

Books for Study:

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

Unit I : Chapter:1:1.1.1-1.1.6
Unit II : Chapter:2:2.1-2.3
Unit III : Chapter:3:3.1.4-3.1.6,3.1.7,3.1.10
Unit IV : Chapter:4:4.1,4.2.4,4.2.5,4.2.7,4.3.1,4.3.2,4.3.3
Unit V : Chapter 5:5.1,5.2,5.4-5.4.1,5.4.2

Books for References:		
1. Baloch,R.,Ethical HackingandPenetrationTestingGuide,CRCPress,2015. 2. CharlesP.Pfleeger, Shari Lawrence Pfleeger,Jonathan Margulies,Security in Computing,5thEdition,Pearson Education,2015 3. William, Stallings. (2018). Effective Cyber security: A Guide to Using Best Practices and Standards, Addison - Wesley Professional Publishers, 1st Edition.		
Web Resources:		
1.https://onlinecourses.swayam2.ac.in/ugc19_hs25/preview **2. https://www.edx.org/course/cybersecurity-fundamentals** **3.https://www.coursera.org/specializations/cyber-security**		
Course Outcomes		**K Level**
At the end of the course, the students will able to		
CO1:	Demonstrate the fundamentals about network security	**K3**
CO2:	Examine different forms of hacking technique and prevention methods	**K3**
CO3:	Illustrate software vulnerabilities and security solutions to reduce the risk of exploitation.	**K3**
CO4:	Compare the performance and troubleshoot cyber security system	**K4**
CO5:	Interpret cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Cyber Security Fundamentals:** Network and Security Concepts - Information Assurance Fundamentals - Basic Cryptography - Symmetric Encryption - Public Key Encryption -The Domain Name System(DNS)-Firewalls	15	Chalk & Talk, ICT Kit
II	**Attacker Techniques and Motivations** :How Hackers Cover Their Tracks(Anti forensics)-Tunneling Techniques-Fraud Techniques-Rogue Antivirus-Click Fraud-Threat Infrastructure	15	Chalk & Talk, ICT Kit
III	**Exploitation:** Format String Vulnerabilities-SQL Injection– Protecting against SQL injection- Malicious PDF Files-PDF File Format-Creating Malicious PDF Files-Reducing the risks of Malicious PDF Files- Race conditions – Brute Force and Dictionary Attacks	17	Chalk & Talk, ICT Kit
IV	**MaliciousCode:** Self-Replicating Malicious Code-Rootkits-Spyware-Token Kidnapping- Stealing formation and Exploitation-Form Grabbing-Man-in-the-Middle Attacks–DLL Injection	13	Chalk & Talk, ICT Kit
V	**DefenseandAnalysisTechniques:** 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 – Automated Malicious Code Analysis Systems-Passive Analysis-Active Analysis	15	Chalk & Talk, ICT Kit

Course Designed by: Mrs.R.Vasuki & Mr M.Ramesh Kumar Assistant Professor

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	
	K3	-	-	10	10	20	40	40
	K4	-	-	10	10	20	40	40
	K5	-	-	-	-	-	-	-
	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	CO1	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
3	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)
No. of Questions to be Asked			10	K1,K2	5	K2	10	5
No.of Questions to be answered			10	K1,K2	5	K2	5	3
Marks for each question			1	K1,K2	2	K2	5	10
Total Marks for each section			10	K1,K2	10	K2	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	30	60	50	50
K4	-	-	20	20	40	34	34
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	K1	
12	CO2	K1	
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**CLIENT SERVER COMPUTING**			
Course Code	**21UCAE62**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Promote a simple understanding of how to design a Client Server application.
- Afford learners with a summary of the concepts and fundamentals of client/server computing.
- Identify the various components of client server applications.
- Recognize the concept of client/server systems development methodology.
- Gain a better understanding of new computing paradigms.

Unit: I	**Client/Server Computing**	**15hrs**

Client/Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic.

Unit: II	**Components of Client/Server Applications – The Client and The Server**	**15hrs**

The Role of the Client – Client Services – Request for Service - The Role of the Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

Unit: III	**Components of Client/Server Applications – Connectivity**	**15hrs**

Open System Interconnect – Communications Interface Technology – Interprocess communication – Wide Area Network Technologies.

Unit: IV	**Client/Server Systems Development –Software and Hardware**	**15hrs**

Factors Driving demand – Need to Improve Technology – Need for Platform Migration – Client/Server Systems Development Methodology. Components of Client/Server Applications– Hardware: Hadware/Network Acquisition – PC Level Processing Units – Machintosh, notebooks, Pen – UNIX Workstation – x-terminals – Disk, Tape, Optical Disks, NIC and UPS.

Unit: V	**The Future of Client/Server Computing**	**15hrs**

Enabling Technologies – Transformational Systems – Emergency Public Safety – Electronic Data Interchange – Financial Analysis.

	Total Lecture Hours	**75 Hrs**

Books for Study:

1. Patrick Smith,Steve Guengerich, Client/Server Computing, Prentice Hall of India Private Limited, New Delhi, 2nd Edition, 1994

Unit 1: Chapters 1,2
Unit 2: Chapters 3,4
Unit 3: Chapter 5
Unit 4: Chapters 6,7
Unit 5: Chapter10

Books for References:

1. Essential Client/Server Survival Guide, Robert Orfali, Dan Harkey and Jerri Edwards, John Wiley &Sons Inc 1996.

2. A complete guide to Client / Server computing, First Edition, Eric J Johnson, Prentice Hall, New Delhi, 2001.
3. Client And Server Computing, 2nd Edition , Munesh Chandra Trivedi, Khanna Publishing House, 2014.

Web Resources:

- **https://www.tutorialspoint.com/Client-Server-Computing**
- **https://www.javatpoint.com/computer-network-client-and-server-model**
- **https://teachcomputerscience.com/client-server-architecture/**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Examine the advantages of client server computing.	**K3**
CO2:	Discover the components of client server applications.	**K3**
CO3:	Determine the concepts of client server using inter process communication mechanism.	**K3**
CO4:	Explain the importance of client/server systems development methodology.	**K4**
CO5:	Illustrate the future of client/server computing with the latest technologies.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**Client/Server Computing**: Client/Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic.	**15**	**PowerPoint Presentation & ICT Tools**
II	**Components of Client/Server Applications – The Client:** The Role of the Client – Client Services – Request for Service. **Components of Client/Server Applications – The Server:** The Role of the Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.	**15**	**Lecture & PowerPoint Presentation**
III	**Components of Client/Server Applications – Connectivity:** Open System Interconnect – Communications Interface Technology – Interprocess communication – Wide Area Network Technologies.	**15**	**Lecture & ICT Tools**
IV	**Client/Server Systems Development – Software:** Factors Driving demand – Need to Improve Technology – Need for Platform Migration – Client/Server Systems Development Methodology. **Components of Client/Server Applications – Hardware:** Hadware/Network Acquisition – PC Level Processing Units – Machintosh, notebooks, Pen – UNIX Workstation – x-terminals – Disk, Tape, Optical Disks, NIC and UPS.	**15**	**PowerPoint Presentation**
V	**The Future of Client/Server Computing:** Enabling Technologies – Transformational Systems – Emergency Public Safety – Electronic Data Interchange – Financial Analysis.	**15**	**Lecture**

Course Designed by: **Mrs. M. Muthulakshmi & Mrs R.Vasuki Assistant Professor**

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**MOBILE COMPUTING**			
Course Code	**21UCAE63**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5

Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Understand the basic concepts of mobile computing.
- Learn the basics of mobile telecommunication system
- To be familiar with the network layer protocols and Ad-Hoc networks
- Know the basis of transport and application layer protocols
- Gain knowledge about different mobile platforms and application development.

Unit: I	**Introduction**	**15**

Mobility of Bits &Bytes – Wireless – The Beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and Services – Developing mobile computing applications –Security in mobile computing.

Unit: II	**Mobile Computing Architecture and Emerging Technologies**	**15**

Internet – The ubiquitous network – Architecture for mobile computing – Three – tier architecture – Design considerations for mobile computing –Mobile computing through internet.
Introduction – Bluetooth– RFID – Wireless broadband – MobileIP – IPV6 – Javacard.

Unit: III	**Short Message Service (SMS), General Packet Radio Service (GPRS)**	**15**

Mobile Computing Over SMS – Short Message Service (SMS) – Value Added Services through SMS – Accessing the SMS Bearer.
Introduction – GPRS & Packet data network – Network architecture – Network operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS.

Unit: IV	**Wireless Application Protocol (WAP) and Wireless LAN**	**15**

Introduction – WAP – MMS GPRS – Applications - **Wireless LAN:** Advantages – IEEE802.11 standards – Wireless LAN Architecture – Mobility in wireless LAN – Deploying WLAN –Mobile Adhoc networks and Sensor networks –Wireless LAN.Security – Wireless access inVehicular environment – Wireless local loop – HiperLAN – WIFI versus 3G.

Unit: V	**Wireless Devices with Symbian OS**	**15**

Introduction to Symbian OS – Symbian OS Architecture – Applications for Symbian – Controls and Compound Controls – Active Objects – Localizations – Security on the Symbian OS – Latest in Symbian.

	Total Lecture Hours	**75 Hrs**

Books for Study:

1. Asoke K Talukder, Hasan Ahmed, RoopaRYavagal, "Mobile Computing-Technology, Applicationsand Service Creation",Second Edition, Tata McGraw Hill, NewDelhi, 2012.

UnitI: Chapter 1.1to1.9
Unit 2 : Chapter 2: 2.3,2.4,2.5,2.6,3
Chapter 4
Unit 3: Chapter 6, Chapter 7: 7.1 to 7.7
Unit 4: Chapter 8

Chapter 10 Unit 5 : Chapter 14
Books for References:
1. William Stallings, "Wireless Communications and Networks", 2nd Edition, Pearson Education, Delhi, 2004. 2. Jochenschiller "Mobile communications" Second edition,Pearson 2019 3. UWE Hansmann, Lother Merk, Martin S.Nocklous, Thomas Stober, "Principles of Mobile Computing" , 2nd Edition, Springer, 2003.
Web Resources:
• **https://www.javatpoint.com/mobile-computing** • **https://www.phptpoint.com/mobile-computing-tutorial/** • **https://www.educba.com/mobile-computing-types/**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Discover the fundamentals of wireless communications.	**K3**
CO2:	Illustrate security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.	**K3**
CO3:	Demonstrate the basic skills for cellular networks design.	**K3**
CO4:	Examine TCP/IP extensions for mobile and wireless networking	**K4**
CO5:	Identify the features of Symbian OS.	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	MOBILE COMPUTING	Hrs	Pedagogy
I	**Introduction:** Mobility of Bits &Bytes – Wireless – The Beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and Services – Developing mobile computing applications –Security in mobile computing.	15	Chalk & Talk, ICT Kit
II	**Mobile Computing Architecture:** Internet – The ubiquitous network – Architecture for mobile computing – Three – tier architecture – Design considerations for mobile computing – Mobile computingthrough internet. **Emerging Technologies:** Introduction – Bluetooth– RFID – Wireless broadband – MobileIP – IPV6 – Javacard.	15	Chalk & Talk, ICT Kit
III	**Short Message Service (SMS):** Mobile Computing Over SMS – Short Message Service (SMS) – Value Added Services through SMS – Accessing the SMS Bearer. **General Packet Radio Service (GPRS):** Introduction – GPRS & Packet data network – Network architecture – Network operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS.	15	Chalk & Talk, ICT Kit
IV	**Wireless Application Protocol (WAP):** Introduction – WAP – MMS GPRS – Applications. **Wireless LAN:** Advantages – IEEE802.11 standards – Wireless LAN Architecture – Mobility in wireless LAN – Deploying WLAN –Mobile Adhoc networks and Sensor networks –Wireless LAN.Security – Wireless access inVehicular environment – Wireless local loop – HiperLAN – WIFI versus 3G.	15	Chalk & Talk, ICT Kit
V	**Wireless Devices with Symbian OS:** Introduction to Symbian OS – Symbian OS Architecture – Applications for Symbian – Controls and Compound Controls – Active Objects – Localizations – Security on the Symbian OS – Latest in Symbian.	15	Chalk & Talk, ICT Kit

Course Designed by: **Mrs. M. Muthulakshmi & M.Ramesh Kumar Assistant Professor**

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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**

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	**20**
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	**80**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	20	50	100	**100**
CIA II	**K1**	2	-	-	--	2	4	**20**
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**COMPUTER GRAPHICS**							
Course Code	**21UCAE64**					**L**	**P**	**C**
Category	**Core Elective**					5	-	5
Nature of course:	**EMPLOYABILITY**		**SKILL ORIENTED**	✓	**ENTREPRENEURSHIP**			✓

Course Objectives:

- To introduce to the principles of computer graphics.
- Understand the need of developing graphics application
- To give idea about basic building blocks of multimedia
- Learn algorithmic development of graphics primitives like: line, circle, polygon etc.
- Learn the representation and transformation of graphical images and picture

Unit: I	**A Survey of Computer Graphics**	**15 Hours**

Computer–Aided Design-Presentation Graphics – Computer Art –Entertainment-Education and Training-Visualization-Image Processing-Graphical User Interface.**Overview of Graphics Systems**: Video-display devices, Raster-Scan systems, Random- Scan systems- Input Devices-Hard-Copy Devices.

Unit: II	**Output Primitives**	**15 Hours**

Points and Lines- Line-Drawing Algorithms – Circle-Generating Algorithms-Ellipse-Generating Algorithms.**Attributes of Output Primitives:** Line Attributes – Curve Attributes – Area-Fill Attributes – Character Attributes – Bundled Attributes.

Unit: III	**Two-Dimensional Geometric Transformations**	**17 Hours**

Basic Transformations – Matrix Representations– Other Transformations. Two-Dimensional Viewing. Clipping Operations-Point Clipping – Line Clipping: Cohen-Sutherland Line Clipping – Liang Barsky Line Clipping – Polygon Clipping: Sutherland – Hodgeman Polygon Clipping – Curve Clipping – Text Clipping .

Unit: IV	**Graphical User Interfaces and Interactive Input Methods**	**13 Hours**

The User Dialogue – Input of Graphical Data – Input Functions.**Three Dimensional Concepts** Three-Dimensional Display Methods – Three Dimensional Graphics Packages.

Unit: V	**Three-Dimensional Geometric and Modeling Transformations**	**15 Hours**

Translation – Rotation – Scaling – Other Transformations.**Computer Animation**: Design of Animation Sequences-General Computer-Animation Functions-Raster Animations - Computer-Animation Languages - Key-Frame Systems - Motion Specifications

	Total Lecture Hours	**75 Hrs**

Books for Study:

1. Donald D. Hearn, M. Pauline Baker "Computer Graphics C Version", Second Edition, Pearson Education, 2014.

Unit I: Chapter 1 – 1.1 to 1.8
Chapter 2 - 2.1 to 2.6
Unit II:Chapter 3 – 3.1 ,3.2,3.5,3.6
Chapter 4 – 4.1,4.2,4.4-4.6
Unit III: Chapter 5 – 5.1-5.2,5.4

Chapter 6 – 6.5- 6.10 Unit IV: Chapter 8 – 8.1- 8.3 Chapter 9 – 9.1,9.2 Unit V: Chapter 11 – 11.1- 11.4 Chapter 16-16.1 to 16.6
Books for References:
1. Computer Graphics, Sunil Kumar Sharma, Manoj Singhal, Pearson Education,2014. 2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003. 3.James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and practice, Second Edition in C, Pearson Education, 2007.
Web Resources:
1. **https://www.javatpoint.com/computer-graphics-tutorial** 2. **https://www.geeksforgeeks.org/introduction-to-computer-graphics/** 3. **https://www.britannica.com/topic/computer-graphics/Shading-and-texturing**

Course Outcomes		**K Level**
At the end of the course the students will be able to		
CO1	Demonstrate computer graphics applications common graphics APIs.	**K3**
CO2	Examine various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	**K3**
CO3	Illustrate about 3D modeling and rendering techniques	**K3**
CO4	Analyze the theory of 2D and 3D transformations, projection and viewing	**K4**
CO5	Develop the application of computer graphics concepts in the development of computer games, information visualization, and business applications	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	COMPUTER GRAPHICS	Hrs	Pedagogy
I	**A Survey of Computer Graphics:**Computer–Aided Design-Presentation Graphics – Computer Art –Entertainment-Education and Training-Visualization-Image Processing-Graphical User Interface. **Overview of Graphics Systems**: Video-display devices, Raster-Scan systems, Random- Scan systems- Input Devices-Hard-Copy Devices.	15	**Chalk & Talk, ICT Kit**
II	**Output Primitives** :Basic Transformations – Matrix Representations– Other Transformations. **Two-Dimensional Viewing**: Clipping Operations-Point Clipping – Line Clipping: Cohen-Sutherland Line Clipping – Liang Barsky Line Clipping – Polygon Clipping: Sutherland – Hodgeman Polygon Clipping – Curve Clipping – Text Clipping	15	**Chalk & Talk, ICT Kit**
III	**Two-Dimensional Geometric Transformations:** Basic Transformations – Matrix Representations– Other Transformations. **Two-Dimensional Viewing**: Clipping Operations-Point Clipping – Line Clipping: Cohen-Sutherland Line Clipping – Liang Barsky Line Clipping – Polygon Clipping: Sutherland – Hodgeman Polygon Clipping – Curve Clipping – Text Clipping	17	**Chalk & Talk, ICT Kit**
IV	**Graphical User Interfaces and Interactive Input Methods:** The User Dialogue – Input of Graphical Data – Input Functions. **Three Dimensional Concepts** Three-Dimensional Display Methods – Three Dimensional Graphics Packages.	13	**Chalk & Talk, ICT Kit**
V	**Three-Dimensional Geometric and Modeling Transformations:**Translation – Rotation – Scaling – Other Transformations.**Computer Animation**: Design of Animation Sequences-General Computer-Animation Functions-Raster Animations - Computer-Animation Languages - Key-Frame Systems - Motion Specifications	15	**Chalk & Talk, ICT Kit**

Course Designed by:Mrs.R.Vasuki & M.Muthlakshmi Assistant Professor

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**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO2	**K3**	**2**	**K1,K2**	**2**	**K2**	**2(K3,K3)**	**1(K3)**
CI AII	**CO3**	**K3**	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
	CO4	**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	-	-	-	-	-	-	-
	K5	-	-	-	-	-	-	-
	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
	K5	-	-	-	-	-	-	-
	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	CO1	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
2	CO2	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
3	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
4	CO4	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)
5	CO5	K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)
No. of Questions to be Asked			10	K1,K2	5	K2	10	5
No. of Questions to be answered			10	K1,K2	5	K2	5	3
Marks for each question			1	K1,K2	2	K2	5	10
Total Marks for each section			10	K1,K2	10	K2	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	30	60	50	50
K4	-	-	20	20	40	34	34
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	K1	
12	CO2	K1	
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,K3	
16) b	CO1	K3,K3	
17) a	CO2	K3,K3	
17) b	CO2	K3,K3	
18) a	CO3	K3,K3	
18) b	CO3	K3,K3	
19) a	CO4	K4,K4	
19) b	CO4	K4,K4	
20) a	CO5	K4,K4	
20) b	CO5	K4,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 APPLICATIONS
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Course Name	**SOFTWARE TESTING**							
Course Code	**21UCAE65**					**L**	**P**	**C**
Category	**Core Elective**					5	-	5
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**			✓

Course Objectives:

1. Employ correct testing terminology throughout the testing process.
2. Execute specific software tests with well-defined objectives and targets.
3. Apply various testing techniques, including domain, code, fault, usage and model-based.
4. Execute program and test evaluations.
5. Perform a complete testing process, taking into account practical considerations.

Unit: I	**Software Development Life cycle Models**	**15**

Phases of Software Project -Assurance and Quality control - Different Phases-Life Cycle Models.

Unit: II	**White Box Testing**	**15**

Definition of White Box Testing – Static Testing – Structural Testing –Challenges in White Box Testing, **Black Box Testing:** Definition of Black Box Testing-When to do black box testing - How do black box testing.

Unit: III	**Integration Testing**	**15**

Definition of Integration Testing - Integration testing as a type of testing - Integration testing as a phase of testing - Scenario Testing - Defect Bash.

Unit: IV	**System and Acceptance Testing**	**15**

System testing overview - Why is system testing done - Functional versus Non Functional Testing - Functional System Testing - Non - Functional Testing - Acceptance Testing - Summary of Testing phases.

Unit: V	**Performance Testing and Regression Testing**	**15**

Factors governing performance testing - methodology for performance testing - tools for performance testing - Process for Performance testing.**Regression Testing :** Definition of Regression Testing -

	Total Lecture Hours	**75 Hrs**

Books for Study:

1.Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing Principles and Practices", Pearson Edition, 2014.

UNIT I : Chapter 2
UNIT II : Chapter 3,4
UNIT III : Chapter 5
UNIT IV : Chapter 6
UNIT V : Chapter 7,8

Books for References:

1. William Perry, "Effective Methods for Software Testing", John Wiley &Sons
2. Richard E. Fairly, "Software Engineering Concepts", McGraw Hill Edition

Web Resources:		
1. https://www.tutorialspoint.com/software_testing/index.htm 2. https://www.softwaretestinghelp.com/manual-testing-tutorial-1/ 3. https://www.w3schools.in/software-testing/tutorials/		
Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Examining SDLC and motivation for testing	**K3**
CO2:	Determine the types of testing.	**K3**
CO3:	Implement the characteristics of system testing and integration testing	**K3**
CO4:	Analyze Understand System and Acceptance Testing.	**K4**
CO5:	Analyze SDLC and motivation for testing	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Phases of Software Project -Assurance and Quality control - Different Phases- Life Cycle Models.	**15**	PPT / CHALK & TALK
II	Definition of White Box Testing – Static Testing – Structural Testing – Challenges in White Box Testing, **Black Box Testing:** Definition of Black Box Testing-When to do black box testing - How do black box testing.	**15**	PPT / CHALK & TALK
III	Definition of Integration Testing - Integration testing as a type of testing - Integration testing as a phase of testing - Scenario Testing - Defect Bash.	**15**	PPT / CHALK & TALK
IV	System testing overview - Why is system testing done - Functional versus Non Functional Testing - Functional System Testing - Non - Functional Testing - Acceptance Testing - Summary of Testing phases.	**15**	PPT / CHALK & TALK
V	Factors governing performance testing - methodology for performance testing - tools for performance testing - Process for Performance testing.**Regression Testing :** Definition of Regression Testing -	**15**	PPT / CHALK & TALK

Course Designed by: **Mrs.G.Mahalakshmi Mrs R.Vasuki Assistant Professor**

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	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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

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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	--	2	4	20
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**BIG DATA ANALYTICS**			
Course Code	**21UCAE66**	**L**	**P**	**C**
Category	**Core Elective**	5	-	5
Nature of course:	**EMPLOYABILITY** ✓	**SKILL ORIENTED** ✓	**ENTREPRENURSHIP**	✓

Course Objectives:

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Provide hands on Hadoop Eco System

Unit: I	**Types of Digital data**	**15**

Classification of Digital Data. **Introduction to Big Data**: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data –What is Big Data – **Big Data Analytics** - What is Big Data Analytics – Classification of Analytics – Top challenges facing Big Data – Importance of Big Data Analytics – Data Science – Data Scientist – Terminologies used in Big Data Environment

Unit: II	**The Big Data Technology Landscape and Hadoop**	**20**

NoSQL – Types of NoSQL Database – 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 Ecosystems – Hadoop vs SQL – Integrated Hadoop System – Cloud-Based Hadoop Solutions.RDBMS vs Hadoop – History of Hadoop – Overview of Hadoop-– Hadoop distributors – HDFS – Processing data with Hadoop – Managing resources and Application with Hadoop YARN.

Unit: III	**Introduction to Cassandra**	**10**

Apache Cassandra – an introduction-Features of cassandra – CQL data types – CQLSH-Key spaces – CRUD– Collectons-Using a counter – Time to live – Alter commands – Import and Export– Map Reduce.

Unit: IV	**Introduction to Hive and Machine Learning**	**15**

What is Hive - Hive Architecture -Hive Data types -Hive File Format-Hive Query language - **Introduction to Machine Learning**: Introduction – Machine Learning Definition – Machine Learning Algorithms – Regression Model – Linear Regression – Clustering – Collaborative Filtering – Association Rule Mining – Decision Tree.

Unit: V	**Introduction to Pig**	**15**

What is Pig - The anatomy of Pig - Pig on hadoop - Pig latin overview - Data types in Pig - Running Pig – Execution modes of Pig – HDFS commands – Relational Opeartors – Eval Function – Complex data types.

	Total Lecture Hours	**75 Hrs**

Books for Study:

1.Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley, 2019, New Delhi.
Unit I - Chapter 1- 1.1
Chapter 2 - 2.1 To 2.5 , 3.2, 3.5, 3.8, 3.9, 3.10 to 3.12

Unit II - Chapter 4 – 4.1 & 4.2 Chapter 5 - 5.4,5.6,5.7,5.9 to 5.12 Unit III -Chapter 7 - 7.1 to 7.11 Chapter 8 Unit IV-Chapter 9 Chapter 12 Unit V- Chapter 10
Books for References:
1. DT Editorial Services, Big Data, Black book, Ninth Edition, Dreamtech, 2016, New Delhi. 2. Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization (2016), DT Editorial Services 3. Tom White, Hadoop: The Definitive Guide, 4th Edition (2015)
Web Resources:
1. **https://www.tutorialspoint.com/big_data_analytics/index.htm** 2. **https://www.javatpoint.com/what-is-big-data** 3. **https://intellipaat.com/blog/big-data-tutorial-for-beginners/**

Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics	**K3**
CO2:	Implement Big Data Activities using Hive.	**K3**
CO3:	Determining Algorithms to solve Data Intensive Problems using Map Reduce Paradigm	**K3**
CO4:	Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics	**K4**
CO5:	Explaining Big Data and its analytics in the real world	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Classification of Digital Data. **Introduction to Big Data**: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data –What is Big Data – **Big Data Analytics** - What is Big Data Analytics – Classification of Analytics – Top challenges facing Big Data – Importance of Big Data Analytics – Data Science – Data Scientist – Terminologies used in Big Data Environment	15	**PPT / CHALK & TALK**
II	NoSQL – Types of NoSQL Database – 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 Ecosystems – Hadoop vs SQL – Integrated Hadoop System – Cloud-Based Hadoop Solutions.RDBMS vs Hadoop – History of Hadoop – Overview of Hadoop-– Hadoop distributors – HDFS – Processing data with Hadoop – Managing resources and Application with Hadoop YARN.	20	**PPT / CHALK & TALK**
III	**Introduction to Cassandra** – Apache Cassandra – an introduction-Features of cassandra – CQL data types – CQLSH-Key spaces – CRUD– Collectons-Using a counter – Time to live – Alter commands – Import and Export– Map Reduce.	10	**PPT / CHALK & TALK**
IV	**Introduction to Hive:**What is Hive - Hive Architecture -Hive Data types -Hive File Format-Hive Query language -**Introduction to Machine Learning**: Introduction – Machine Learning Definition – Machine Learning Algorithms – Regression Model – Linear Regression – Clustering – Collaborative Filtering – Association Rule Mining – Decision Tree.	15	**PPT / CHALK & TALK**
V	**Introduction to Pig:**What is Pig - The anatomy of Pig - Pig on hadoop - Pig latin overview - Data types in Pig - Running Pig – Execution modes of Pig – HDFS commands – Relational Opeartors – Eval Function – Complex data types.	15	**PPT / CHALK & TALK**

Course Designed by: **Mrs.G.Mahalakshmi & 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 Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K - Level	No. of. Questions	K - Level		
CI AI	CO1	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO2	K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)
CI AII	CO3	K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)
	CO4	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

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	20
	K2	2	6	-	-	8	16	
	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
CIA II	K1	2	-	-	--	2	4	20
	K2	2	6	-	-	8	16	
	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	CO1	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
2	CO2	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
3	CO3	K3	**2**	**K1,K2**	**1**	**K2**	**2(K3,K3)**	**1(K3)**
4	CO4	K4	**2**	**K1,K2**	**1**	**K2**	**2(K4,K4)**	**1(K4)**
5	CO5	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	30	60	50	50
K4	-	-	20	20	40	34	34
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 APPLICATIONS
(For those who joined in 2021-2022 and after)

Course Name	**ANDROID DEVELOPMENT LAB**							
Course Code	**21UCASP6**					**L**	**P**	**C**
Category	**Skilled**					2	-	2
Nature of course:	**EMPLOYABILITY**	✓	**SKILL ORIENTED**	✓	**ENTREPRENURSHIP**			✓

Course Objectives:

- To gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment
- Learn the basics of Android platform and get to understand the application lifecycle
- Creating robust mobile applications and learn how to integrate them with other services
- Creating intuitive, reliable mobile apps using the android services and components
- Designing of User Interface and Layouts for Android App.

1 **2** **3**	Displaying "Welcome to Android Laboratory" Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button Different ways of handling button click event. Different ways of handling button click event. Different ways of handling button click event. Different ways of handling button click event. Different ways of handling button	**8**
4 **5** **6**	Create simple and effective Login form on Android Create registration form in android Develop an application that uses GUI components Font and Colors	**7**
7 **8** **9**	Design a simple User Interface layout Develop simple toast Build android app using Widget	**6**
10 **11**	Develop Calculator Android application Design an android application Using Radio buttons	**6**
12 **13**	Implement the notification concept in Android Create Simple Browser	**3**
	Total Lecture Hours	**30 Hrs**

Web Resources:

1. **https://www.tutorialspoint.com/android/index.htm**
2. **https://developer.android.com/training/basics/firstapp**

3. https://www.javatpoint.com/android-tutorial		
Course Outcomes		**K Level**
At the end of the course, the students will be able to		
CO1:	Discover the basic concepts of Android platform	**K3**
CO2:	Practice simple GUI applications, use built-in widgets and components, work with the database to store data locally and much more	**K3**
CO3:	Design and develop user interfaces for the Android platform.	**K3**
CO4:	Develop rich user Interfaces by using layouts and controls	**K4**
CO5:	Apply a mobile development framework to the development of a mobile application	**K4**

CO & PO Mapping:

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

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

LESSON PLAN

	List of Programs	Hrs	Pedagogy
1 2 3	Displaying "Welcome to Android Laboratory" Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button Different ways of handling button	30	PPT
4 5 6	Create simple and effective Login form on Android Create registration form in android Single level & Multi level inheritance		
7 8 9	Design a simple User Interface layout Develop simple toast Build android app using Widget		
10 11	Develop Calculator Android application Implement the notification concept in Android		
12 13	Implement the notification concept in Android Create Simple Browser		

Course Designed by: Mrs.R.Vasuki & Mrs G.Mahalakshmi Assistant Professor