

BCA

Syllabus

Program Code: UCA

2023-2024 onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with “A” Grade by NAAC

PASUMALAI, MADURAI – 625 004

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

(FOR UG PROGRAM FROM 2023 -2024 ONWARDS)

ELIGIBILITY FOR ADMISSION

Candidates seeking admission to the UG Degree program must have passed the Higher Secondary Education (respective groups – Arts / Science) of the Government of Tamil Nadu or any other state or its equivalent qualification.

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 / Hindi /

Part II : English

Part III:

- 1.Core Subjects
- 2.Allied Subjects
- 3.Electives

Part IV:

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

Part V :

Extension Activities

ARTS & SCIENCE

CBCS COURSE STRUCTURE FOR UG PROGRAMS

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language - Tamil	3	2.1. Language - Tamil	3	3.1. Language - Tamil	3	4.1. Language - Tamil	3	5.1 Core Course - \CC IX	4	6.1 Core Course - CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course - CC X	4	6.2 Core Course - CC XIV	4
1.3 Core Course - CC I	4	2.3 Core Course - CC III	4	3.3 Core Course - CC V	4	4.3 Core Course - CC VII Core Industry Module	4	5.3. Core Course - CC -XI	4	6.3 Core Course - CC XV	4
1.4 Core Course - CC II	4	2.4 Core Course - CC IV	4	3.4 Core Course - CC VI	4	4.4 Core Course - CC VIII	4	5.3. Core Course - / Project with viva-voce CC - XII	4	6.4 Elective -VII Generic/ Discipline Specific	3
1.5 Elective I Generic/ Discipline Specific	3	2.5 Elective II Generic/ Discipline Specific	3	3.5 Elective III Generic/ Discipline Specific	3	4.5 Elective IV Generic/ Discipline Specific	3	5.4 Elective V Generic/ Discipline Specific	3	6.5 Elective VIII Generic/ Discipline Specific	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.6 Skill Enhancement Course SEC-6	2	5.5 Elective VI Generic/ Discipline Specific	3	6.6 Extension Activity	1
1.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.7 Skill Enhancement Course - SEC-3(NME)	2	3.7 Skill Enhancement Course SEC-5	2	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
1.8 Skill Enhancement - (Foundation Course)	2	2.8 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.5 Summer Internship /Industrial Training	2		
				3.8 E.V.S	-	4.8 E.V.S	2				
	23		23		22		25		26		21
Total Credit Points											140

**QUESTION PAPER PATTERN 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 x 01= 04 Marks

Part –B

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

Part –C

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

Total 30 Marks

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 / Quiz Test --5 marks

Assignment --5 marks

Total 25 Marks

QUESTION PAPER PATTERN FOR THE SUMMATIVE EXAMINATIONS:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions 10 x 01 = 10 Marks

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

Part –B

Five Paragraph questions ('either or 'type) 5 x 05 = 25 Marks

(One question from each Unit)

Part –C

Five Paragraph questions ('either or 'type) 5 x 08 = 40 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)

QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL ASSESSMENT (SKILL BASED AND NME COURSES) DURATION – 1 HOUR

- ❖ 50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and converted for 15 marks

THE COMPONENTS FOR CONTINUOUS INTERNAL ASSESSMENT ARE:

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

Total	25 Marks

SUMMATIVE EXAMINATION PATTERN (SKILL BASED AND NME COURSES) DURATION – 3 HOURS

Pattern of the Question Paper for Skill Based and Non-Major Elective courses
(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
QUESTION PAPER PATTERN (INTERNAL ASSESSMENT)

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

50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and
converted for 15 marks

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

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

Internal Examinations - - 25 Marks

Summative Examinations - - 75 Marks

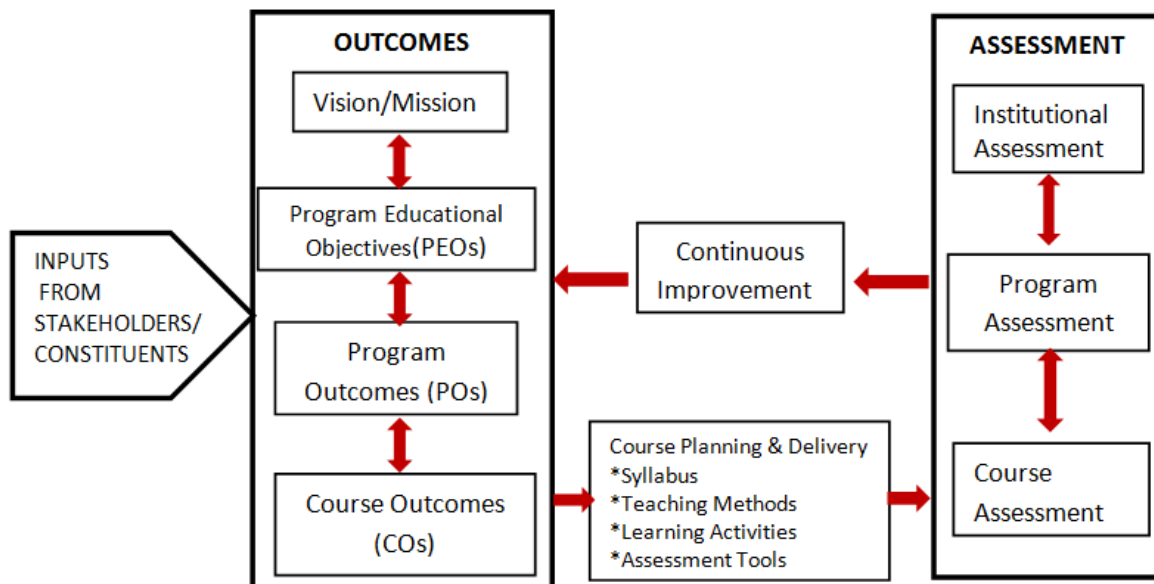
100

OUTCOME BASED EDUCATION:

OBE starts with the identification and articulation of clear and measurable learning outcomes for each course or program. These outcomes describe the skills, knowledge, and abilities that students are expected to acquire. The curriculum, instructional methods, and assessments are aligned with the defined learning outcomes. This ensures that everything taught and evaluated is directly related to what students are expected to learn.

The Learning Outcomes-Based Approach to curriculum planning and transaction in our institution ensures whether the teaching-learning processes are oriented towards enabling students to attain the defined learning outcomes relating to the courses within a programme. The outcome based approach, particularly in the context of undergraduate studies, requires a significant shift from teacher-centric to learner-centric pedagogies and from passive to active/participatory pedagogies.

Assessment Method: The students are assessed with 2 internal examination and the summative examination which includes problem based assignments; practical assignment laboratory reports; observation of practical skills; individual project reports ,case-study reports; team project reports; oral presentations, including seminar presentation; viva voce interviews; computerized adaptive testing; etc. and any other pedagogic approaches as per the context.



INSTITUTIONAL VISION

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

INSTITUTIONAL MISSION

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

Highlights of the Revamped Curriculum:

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

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

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),
MADURAI – 625 004
BACHELOR OF COMPUTER APPLICATIONS CURRICULUM
(For the student admitted during the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	Tamil / Hindi Course					
23UTAGT11 / 23UHIG11	தமிழ் இலக்கிய வரலாறு - I / HINDI KA SAMANYA GYAN AUR NIBANDH	6	3	25	75	100
Part – II	English					
23UENGE11	GENERAL ENGLISH - I	6	3	25	75	100
Part - III	Core Courses					
23UCACC11	PYTHON PROGRAMMING	5	5	25	75	100
23UCACP11	PYTHON PROGRAMMING LAB	5	5	25	75	100
Part - III	Elective Course					
23UMTEA12	NUMERICAL METHODS	4	3	25	75	100
Part IV	Non Major Elective					
23UCANM11	OFFICE AUTOMATION	2	2	25	75	100
Part IV	Foundation Course					
23UCAFC11	STRUCTURED PROGRAMMING IN C	2	2	25	75	100
Total		30	23	175	525	700
SECOND SEMESTER						
Part – I	Tamil / Hindi Course					
23UTAGT21 / 23UHIG21	தமிழ் இலக்கிய வரலாறு – II / KATHA SAHITYA AUR VYAKARAN	6	3	25	75	100
Part – II	English					
23UENGE21	GENERAL ENGLISH - II	6	3	25	75	100
Part - III	Core Courses					
23UCACC21	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	5	5	25	75	100
23UCACP21	C++ PROGRAMMING LAB	5	5	25	75	100
Part - III	Elective Course					
23UCAEC21	INTRODUCTION TO DATA SCIENCE	4	3	25	75	100
Part IV	Non Major Elective					
23UCANM21	UNDERSTANDING INTERNET	2	2	25	75	100
Part IV	Skill Enhancement course					
23UCASP21	ADVANCED EXCEL LAB	2	2	25	75	100
Total		30	23	175	525	700

FIRST SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	PYTHON PROGRAMMING			
Course Code	23UCACC11	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To make students understand the concepts of Python programming.➤ To apply the OOPs concept in PYTHON programming.➤ To impart knowledge on demand and supply concepts.➤ To make the students learn best practices in PYTHON programming.➤ To know the costs and profit maximization.				
UNIT – I Basics of Python Programming, Python Arrays				15
Basics of Python Programming: History of Python - Features of Python – Literal – Constants – Variables – Identifiers – Keywords - Built-in Data Types - Output Statements – Input Statements - Comments – Indentation – Operators – Expressions - Type conversions. Python Arrays: Defining and Processing Arrays–Array methods.				
UNIT - II Control Statements				15
Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.				
UNIT - III Functions, Strings				15
Functions: Function Definition – Function Call – Variable Scope and its Life time-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function –Modules and Namespace– Defining our own modules.				
UNIT - IV Lists, Tuples, Dictionaries				15
Lists: Creating a list - Access values in List - Updating values in Lists - Nested lists - Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple–Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.				
UNIT - V Python File Handling				15
Python File Handling: Types of files in Python -Opening and Closing files-Reading and Writing files: write () and write lines () methods - append () method – read () and read lines () methods–with keyword – Splitting words – File methods - File Positions - Renaming and deleting files.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- Reema Thareja, Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.
- Dr.R.Nageswara Rao, Core Python Programming, First Edition, 2017, Dreamtech Publishers.

BOOKS FOR REFERENCES:

- Vamsi Kurama, Python Programming: A Modern Approach, Pearson Education.
- Mark Lutz, Learning Python, Orielly.
- Adam Stewarts, Python Programming, Online.
- Fabio Nelli, Python Data Analytics, APress.
- Kenneth A.Lambert, Fundamentals of Python– First Programs, CENGAGE Publication.

WEB RESOURCES:

- ❖ <https://www.guru99.com/python-tutorials.html>
- ❖ <https://www.programiz.com/python-programming>
- ❖ https://www.w3schools.com/python/python_intro.asp
- ❖ <https://www.geeksforgeeks.org/python-programming-language/>
- ❖ [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

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

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1 to K4
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	K1 to K4
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K1 to K4
CO4	Work with List, Tuples and dictionary; Write program using list, Tuples and dictionary.	K1 to K4
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K1 to K4

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

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	2	3	3
CO 2	3	2	2	3	2
CO 3	3	2	2	3	2
CO 4	3	2	2	3	2
CO 5	3	2	2	3	3
WEITAGE	15	10	10	15	13
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	67	67	100	87

LESSON PLAN:			
UNIT	PYTHON PROGRAMMING	HRS	PEDAGOGY
I	Basics of Python Programming: History of Python - Features of Python – Literal – Constants – Variables – Identifiers – Keywords - Built-in Data Types - Output Statements – Input Statements - Comments – Indentation – Operators – Expressions - Type conversions. Python Arrays: Defining and Processing	15	Black Board/PPT

	Arrays–Array methods.		
II	Control Statements: Selection / Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.	15	Black Board/PPT
III	Functions: Function Definition – Function Call – Variable Scope and its Life time-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement - The Python module – dir() function –Modules and Namespace– Defining our own modules.	15	Black Board/PPT
IV	Lists: Creating a list - Access values in List - Updating values in Lists - Nested lists - Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple– Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	15	Black Board/PPT
V	Python File Handling: Types of files in Python -Opening and Closing files-Reading and Writing files: write () and write lines () methods - append () method – read () and read lines () methods–with keyword – Splitting words – File methods - File Positions - Renaming and deleting files.	15	Black Board/PPT

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

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100

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

Summative Examinations - Question Paper – Format

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

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3		
OR					
11. b)	Unit - I	CO1	K3		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K3		
OR					
13. b)	Unit - III	CO3	K3		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4		
OR					
16. b)	Unit - I	CO1	K4		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K4		
OR					
18. b)	Unit - III	CO3	K4		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	PYTHON PROGRAMMING LAB			
Course Code	23UCACP11	L	P	C
Category	CORE	-	5	5
COURSE OBJECTIVES				
<ul style="list-style-type: none">➤ Be able to design and program Python applications.➤ Be able to create loops and decision statements in Python.➤ Be able to work with functions and pass arguments in Python.➤ Be able to build and package Python modules for reusability.➤ Be able to read and write files in Python.				
S. No.	LAB EXERCISE	75		
1.	Program using variables, constants, I/O statements in Python.			
2.	Program using Operators in Python.			
3.	Program using Conditional Statements.			
4.	Program using Loops.			
5.	Program using Jump Statements.			
6.	Program using Functions.			
7.	Program using Recursion.			
8.	Program using Arrays.			
9.	Program using Strings.			
10.	Program using Modules.			
11.	Program using Lists.			
12.	Program using Tuples.			
13.	Program using Dictionaries.			
14.	Program for File Handling.			
Total Lecture Hours				75

BOOKS FOR STUDY:

- Dr.R.Nageswara Rao, Core Python Programming, First Edition, 2017, Dreamtech Publishers.
- Eric Matthes, Python Crash Course, 2nd Edition, 2019, No Starch Press.
- Mark Lutz, Learning Python, 5th Edition, 2013, O'Reilly Media.

BOOKS FOR REFERENCES:

- Al Sweigart, Automate the Boring Stuff with Python, 2nd Edition, 2019, No Starch Press.
- Wes McKinney, Python for Data Analysis, 2nd Edition, 2017, O'Reilly Media.
- KennethA.Lambert, Fundamentals of Python–First Programs, CENGAGE Publication.

WEB RESOURCES:

- ❖ <https://www.programiz.com/python-programming>
- ❖ <https://www.geeksforgeeks.org/python-programming-language/>
- ❖ <https://docs.python-guide.org/>
- ❖ <https://www.pythonweekly.com/>
- ❖ <http://pythontutor.com/>

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made			New Course		✓

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

COURSE OUTCOMES:**K LEVEL****After studying this course, the students will be able to:**

CO1	Demonstrate the understanding of syntax and semantics.	K1 to K4
CO2	Identify the problem and solve using PYTHON programming techniques.	K1 to K4
CO3	Identify suitable programming constructs for problem solving.	K1 to K4
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K1 to K4
CO5	Develop a PYTHON program for a given problem and test for its correctness.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

CO5	S	S	S	S	M	L	S	M	L	M
S- STRONG			M – MEDIUM				L – LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	2	2	2	2	3	2
CO 2	2	1	3	2	-	2
CO 3	3	3	1	1	1	2
CO 4	2	3	3	1	-	1
CO 5	3	2	3	1	1	-
WEITAGE	12	11	12	7	5	7
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	80	73	80	47	33	47

LESSON PLAN:

UNIT	PYTHON PROGRAMMING LAB	HRS	PEDAGOGY
1	Program using variables, constants, I/O statements in Python.	75	Demonstration Hands-on Training
2	Program using Operators in Python.		
3	Program using Conditional Statements.		
4	Program using Loops.		
5	Program using Jump Statements.		
6	Program using Functions.		
7	Program using Recursion.		
8	Program using Arrays.		
9	Program using Strings.		
10	Program using Modules.		
11	Program using Lists.		
12	Program using Tuples.		
13	Program using Dictionaries.		
14	Program for File Handling.		

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

Internal	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CIAI	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA	No. of Questions to be asked		2	2	2	2	2
	No. of Questions to be answered		2	2	2	2	2
	Marks for each question		2.5	2.5	2.5	2.5	2.5
	Total Marks for each section		5	5	5	5	5

Distribution of Marks with K Level CIA

	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
	K4					5	5	20	20
	Marks						25	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
1	CO1	K1	15				
2	CO2	K2		15			
3	CO3	K3			15		
4	CO4	K3				15	
5	CO5	K4					15
Question Pattern		No. of Questions to be asked	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		Marks for each question	7.5	7.5	7.5	7.5	7.5
		Total Marks for each section	15	15	15	15	15

Distribution of Marks with K Level								
K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15	15		30	40	40
K4					15	15	20	20
Marks	15	15	15	15	15	75	100	100



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	NUMERICAL METHODS			
Course Code	23UMTEA12	L	P	C
Category	ELECTIVE ALLIED	4	-	3
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To introduce the various topics in Numerical methods.➤ To make understand the fundamentals of algebraic equations.➤ To apply interpolation and approximation on examples.➤ To solve problems using numerical differentiation and integration➤ To solve linear systems, numerical solution of ordinary differential equations				
UNIT - I FUNDAMENTALS OF ALGEBRAIC EQUATION:				12
Solution of algebraic and transcendental equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method				
UNIT - II ITERATIVE, INTERPOLATION AND APPROXIMATION:				12
Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices. Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation				
UNIT -III INTERPOLATION WITH EQUAL INTERVAL:				12
Difference operators and relations. -Interpolation with equal intervals – Newton's forward and backward difference formulae				
UNIT - IV NUMERICAL DIFFERENTIATION AND INTEGRATION:				12
Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule				
UNIT - V INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS:				12
Single step methods – Taylor's series method – Euler's method – Modified Euler's method - RungeKutta method for solving(first, second , Third and 4th) order equations – Multi step methods				
Total Lecture Hours				60
BOOKS FOR STUDY:				
<ul style="list-style-type: none">➤ Numerical Methods, Second Edition, S.Arumugam, A.ThangapandiIssac, A.Somasundaram, SCITECH publications, 2009.				
BOOKS FOR REFERENCES:				
<ul style="list-style-type: none">➤ Mathews J.H. Numerical Method for Maths, Science and Engineering; PHI, New Delhi, 2001➤ Iqbal H. Khan & Q. Hassan Numerical Methods for Engineers and Scientist - Galgotia Publications (P) Ltd., New Delhi – 1997➤ M.K. Jain, S.R.K. Iyengar&R.K.Jain - Numerical Methods for Scientific and Engineering Computation - New Age International(P) Ltd., New Delhi – 1996				
WEB RESOURCES:				
❖ Web resources from NDL Library, E-content from open-source libraries				

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

COURSE OUTCOMES:	K LEVEL
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After studying this course, the students will be able to:		
CO1	Know how to solve various problems on numerical methods	K1 to K4
CO2	Use approximation to solve problems	K1 to K4
CO3	Differentiation and integration concept are applied	K1 to K4
CO4	Apply , direct methods for solving linear systems PO1, PO2,	K1 to K4
CO5	Numerical solution of ordinary differential equations	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

S- STRONG

M – MEDIUM

L - LOW

CO / PO MAPPING:

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

LESSON PLAN:

UNIT	NUMERICAL METHODS	HRS	PEDAGOGY
I	Solution of algebraic and transcendental equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method	12	LCD
II	Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi’s method for symmetric matrices. Interpolation with unequal intervals – Lagrange’s interpolation – Newton’s divided difference interpolation	12	LCD
III	Difference operators and relations. -Interpolation with equal intervals – Newton’s forward and backward difference formulae	12	LCD
IV	Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson’s 1/3 rul	12	LCD
V	Single step methods – Taylor’s series method – Euler’s method – Modified Euler’s method - RungeKutta method for solving(first, second , Third and 4th) order equations – Multi step methods	12	LCD

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

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2 (K3)	2(K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
5	CO5	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100

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

Summative Examinations - Question Paper – Format

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

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3		
OR					
11. b)	Unit - I	CO1	K3		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3			
OR					
13. b)	Unit - III	CO3	K3		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4		
OR					
16. b)	Unit - I	CO1	K4		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K4		
OR					
18. b)	Unit - III	CO3	K4		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	STRUCTURED PROGRAMMING IN C			
Course Code	23UCAFC11	L	P	C
Category	FOUNDATION COURSE	2	-	2

COURSE OBJECTIVES:

- To familiarize the students with the Programming basics and the fundamentals of C.
- Data Types in Mathematical and logical operations.
- To understand the concept using if statements and loops.
- This unit covers the concept of Arrays.
- This unit covers the concept of Functions.
- To understand the concept of implementing pointers

UNIT – I Overview of C

6

Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, datatypes, declaration of variables, Assigning values to variables ---Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.

UNIT - II Decision Making and Branching

6

Decision Making and Branching: Decision making with If, simple IF, IF-ELSE, nested IF-ELSE, ELSE-IF ladder, switch, GOTO statement. **Decision Making and Looping:** While, Do - While, For, Jumps in loops.

UNIT - III Arrays

6

Arrays: Declaration and accessing of one & two – dimensional arrays, initializing two –dimensional arrays, multi-dimensional arrays.

UNIT - IV Functions

6

Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes –character arrays and string functions.

UNIT - V Pointers

6

Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

Total Lecture Hours **30**

BOOKS FOR STUDY:

- E.Balagurusamy, Programming in ANSIC, Fifth Edition, Tata McGraw Hill, 2010

BOOKS FOR REFERENCES:

- Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw Hill, 2018.
- Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
- Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021

WEB RESOURCES:

- ❖ <https://codeforwin.org/>
- ❖ <https://www.geeksforgeeks.org/c-programming-language/>
- ❖ <http://en.cppreference.com/w/c>
- ❖ <http://learn-c.org/>
- ❖ <https://www.cprogramming.com/>

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made			New Course		✓

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

COURSE OUTCOMES:										K LEVEL
After studying this course, the students will be able to:										
CO1	Remember the program structure of C with its syntax and semantics.									K1 to K2
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).									K1 to K2
CO3	Apply the programming principles learnt in real-time problems.									K1 to K2
CO4	Analyze the various methods of solving a problem and choose the best method.									K1 to K2
CO5	Code, debug and test the programs with appropriate test cases.									K1 to K2
MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	S	M	M	M	M	S
CO2	M	S	S	M	M	S	S	L	M	M
CO3	M	L	S	S	L	L	S	M	S	M
CO4	M	M	M	S	S	S	L	M	S	L
CO5	L	M	M	M	M	M	S	S	M	S
S- STRONG			M - MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	1	2	2	2	2	-
CO 2	2	2	2	2	-	2
CO 3	3	2	2	1	1	-
CO 4	3	2	2	1	-	1
CO 5	1	2	2	2	2	3
WEITAGE	7	10	10	8	5	6
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	47	67	67	53	33	40

LESSON PLAN:

UNIT	STRUCTURED PROGRAMMING IN C	HRS	PEDAGOGY
I	Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables, Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.	6	Black Board/PPT
II	Decision Making and Branching: Decision making with If, simple IF, IF-ELSE, nested IF-ELSE, ELSE-IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops.	6	Black Board/PPT
III	Arrays: Declaration and accessing of one & two- dimensional arrays, initializing two-dimensional arrays, multi-dimensional arrays.	6	Black Board/PPT
IV	Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions.	6	Black Board/PPT
V	Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	6	Black Board/PPT

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	
			No. of. Questions	K - Level
CI AI	CO1	K1 – K2	25	K1,K2
	CO2	K1 – K2	25	K1,K2
CI AII	CO3	K1 – K2	25	K1,K2
	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	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	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	OFFICE AUTOMATION			
Course Code	23UCANM11	L	P	C
Category	NON MAJOR ELECTIVE	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Understand the basics of computer systems and its components.➤ Understand and apply the basic concepts of a word processing package.➤ Understand and apply the basic concepts of electronic spread sheet software.➤ Understand and apply the basic concepts of data base management system.➤ Understand and create a presentation using Power Point tool.				
UNIT – I Introductory concepts				6
Introductory concepts: Memory unit – CPU - Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX - Windows. Introduction to Programming Languages.				
UNIT - II Word Processing				6
Word Processing: Open, Save and close word document; Editing text tools, formatting, bullets; Spell Checker –Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options, merge.				
UNIT - III Spreadsheets				6
Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.				
UNIT - IV Database Concepts				6
The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).				
UNIT - V Power point				6
Introduction to Power point - Features – Understanding slide type casting & viewing slides–creating slideshows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.				
Total Lecture Hours				30

BOOKS FOR STUDY:

- Peter Norton, Introduction to Computers – Tata McGraw Hill.

BOOKS FOR REFERENCES:

- Jennifer Ackerman Kettel, GuyHat-Davis, Curt Simmons, Microsoft 2003, Tata McGraw Hill.

WEB RESOURCES:

- ❖ <https://www.udemy.com/course/office-automation-certificate-course/>
- ❖ <https://www.javatpoint.com/automation-tools>

Nature of Course	EMPLOYABILITY			SKILL ORIENTED			ENTREPRENEURSHIP			✓	
Curriculum Relevance	LOCAL		REGIONAL			NATIONAL			GLOBAL		✓
Changes Made in the Course	Percentage of Change			No Changes Made			New Course			✓	

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

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

CO1	Possess the knowledge on the basics of computers and its components.	K1 to K2
CO2	Gain knowledge on Creating Documents, spread sheet and presentation.	K1 to K2
CO3	Learn the concepts of Database and implement the Query In Database.	K1 to K2
CO4	Demonstrate the understanding of different automation tools.	K1 to K2
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:

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

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

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	2	2	2	3	3	1
CO 2	3	1	2	3	3	3

CO 3	3	2	1	2	1	3
CO 4	3	3	2	2	2	1
CO 5	2	2	1	3	1	3
WEITAGE	13	10	8	13	10	11
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	87	67	53	87	67	73

LESSON PLAN:

UNIT	OFFICE AUTOMATION	HRS	PEDAGOGY
I	Introductory concepts: Memory unit – CPU - Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX - Windows. Introduction to Programming Languages.	6	Black Board/PPT
II	Word Processing: Open, Save and close word document; Editing text tools, formatting, bullets; Spell Checker –Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options, merge.	6	Black Board/PPT
III	Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	6	Black Board/PPT
IV	The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).	6	Black Board/PPT
V	Introduction to Power point - Features – Understanding slide type casting & viewing slides–creating slideshows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.	6	Black Board/PPT

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	
			No. of. Questions	K - Level
CI AI	CO1	K1 – K2	25	K1,K2
	CO2	K1 – K2	25	K1,K2
CI AII	CO3	K1 – K2	25	K1,K2
	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	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	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

SECOND SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++			
Course Code	23UCACC21	L	P	C
Category	CORE	5	-	5
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.➤ Understand dynamic memory management techniques using pointers, constructors, destructors, etc.➤ Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.➤ Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.➤ Demonstrate the use of various OOPs concepts with the help of programs.				
UNIT - I Introduction to C++				15
Introduction to C++ - key concepts of Object - Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: Decision Making and Statements: If..else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ inline functions – Function Overloading.				
UNIT - II Classes and Objects				15
Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects – friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.				
UNIT - III Operator Overloading				15
Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.				
UNIT - IV Pointers				15
Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions.				
UNIT - V Files				15
Files –File stream classes – file modes – Sequential Read /Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling- String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.				
Total Lecture Hours				75

BOOKS FOR STUDY:

- E.Balagurusamy, Object-Oriented Programming with C++, TMH 2013, 7th Edition.

BOOKS FOR REFERENCES:

- Ashok N Kamthane, Object-Oriented Programming with ANSI and Turbo C++, Pearson Education 2003.
- Maria Litvin & Gray Litvin, C++ for you, Vikas Publication, 2002.

WEB RESOURCES:

- ❖ <https://alison.com/course/introduction-to-c-plus-plus-programming>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓	
Changes Made in the Course	Percentage of Change			No Changes Made			New Course		✓

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

COURSE OUTCOMES:**K LEVEL**

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

CO1	Remember the program structure of C with its syntax and semantics.	K1 to K4
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers, and files).	K1 to K4
CO3	Apply the programming principles learned in real-time problems.	K1 to K4
CO4	Analyze the various methods of solving a problem and choose the best method.	K1 to K4
CO5	Code, debug, and test the programs with appropriate test cases.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

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

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	2	1	-	-	1

CO 2	2	2	2	1	-	-
CO 3	3	1	1	-	1	-
CO 4	1	2	1	2	2	1
CO 5	3	2	1	2	3	2
WEITAGE	12	9	6	5	6	4
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	80	60	40	33	40	27

LESSON PLAN:

UNIT	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	HRS	PEDAGOGY
I	Introduction to C++ - key concepts of Object - Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: Decision Making and Statements: If..else, jump, go to, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ inline functions – Function Overloading.	15	Black Board/PPT
II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects – friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	15	Black Board/PPT
III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	15	Black Board/PPT
IV	Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions.	15	Black Board/PPT
V	Files –File stream classes – file modes – Sequential Read /Write operations – Binary and ASCII Files –Random Access Operation – Templates – Exception Handling- String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.	15	Black Board/PPT

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

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40

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

Distribution of Marks with K Level

K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100

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

Summative Examinations - Question Paper – Format

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

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3		
OR					
11. b)	Unit - I	CO1	K3		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K3		
OR					
13. b)	Unit - III	CO3	K3		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4		
OR					
16. b)	Unit - I	CO1	K4		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K4		
OR					
18. b)	Unit - III	CO3	K4		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	C++ PROGRAMMING LAB			
Course Code	23UCACP21	L	P	C
Category	CORE	-	5	5

COURSE OBJECTIVES:

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Demonstrate the use of various OOPs concepts with the help of programs.

LAB EXERCISE

75

1. Write a C++ program to demonstrate function overloading, default arguments, and inline functions.
2. Write a C++ program to demonstrate classes and objects.
3. Write a C++ program to demonstrate the concept of passing objects to functions.
4. Write a C++ program to demonstrate friend functions.
5. Write a C++ program to demonstrate the concept of passing objects to functions.
6. Write a C++ program to demonstrate constructors and destructors.
7. Write a C++ program to demonstrate unary operator overloading.
8. Write a C++ program to demonstrate binary operator overloading.
9. Write a C++ program to demonstrate
 - Single inheritance.
 - Multilevel inheritance.
 - Multiple inheritance.
 - Hierarchical inheritance.
 - Hybrid inheritance.
10. Write a C++ program to demonstrate virtual functions.
11. Write a C++ program to manipulate a text file.
12. Write a C++ program to perform sequential I/O operations on a file.
13. Write a C++ program to find the biggest number using command-line arguments.
14. Write a C++ program to demonstrate class templates.
15. Write a C++ program to demonstrate function templates.
16. Write a C++ program to demonstrate exception handling.

Total Lecture Hours

75

BOOKS FOR STUDY:

- E.Balagurusamy, Object-Oriented Programming with C++, TMH 2013, 7th Edition.

BOOKS FOR REFERENCES:

- Ashok N Kamthane, Object-Oriented Programming with ANSI and Turbo C++, Pearson Education 2003.
- Maria Litvin & Gray Litvin, C++ for you, Vikas Publication 2002.

WEB RESOURCES:

- ❖ <https://alison.com/course/introduction-to-c-plus-plus-programming>

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL	REGIONAL		NATIONAL		GLOBAL		✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course		✓	

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

COURSE OUTCOMES:**K LEVEL**

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

CO1	Remember the program structure of C with its syntax and semantics.	K1 to K4
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers, and files).	K1 to K4
CO3	Apply the programming principles learned in real-time problems.	K1 to K4
CO4	Analyze the various methods of solving a problem and choose the best method.	K1 to K4
CO5	Code, debug, and test the programs with appropriate test cases.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

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

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	1	2
CO 2	2	3	3	3	1	2

CO 3	2	3	3	3	1	2
CO 4	2	3	3	3	1	2
CO 5	2	3	3	3	1	2
WEITAGE	11	15	15	15	5	10
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	73	100	100	100	33	67

LESSON PLAN:

UNIT	C++ Programming Lab	HRS	PEDAGOGY
I	<ol style="list-style-type: none"> 1. Write a C++ program to demonstrate function overloading, default arguments, and inline functions. 2. Write a C++ program to demonstrate classes and objects. 3. Write a C++ program to demonstrate the concept of passing objects to functions. 4. Write a C++ program to demonstrate friend functions. 	15	Demonstration
II	<ol style="list-style-type: none"> 1. Write a C++ program to demonstrate the concept of passing objects to functions. 2. Write a C++ program to demonstrate constructors and destructors. 3. Write a C++ program to demonstrate unary operator overloading. 	15	Hands-on Training
III	<ol style="list-style-type: none"> 1. Write a C++ program to demonstrate binary operator overloading. 2. Write a C++ program to demonstrate <ol style="list-style-type: none"> a. Single inheritance. b. Multilevel inheritance. c. Multiple inheritance. d. Hierarchical inheritance. e. Hybrid inheritance. 3. Write a C++ program to demonstrate virtual functions. 	15	Hands-on Training
IV	<ol style="list-style-type: none"> 1. Write a C++ program to manipulate a text file. 2. Write a C++ program to perform sequential I/O operations on a file. 3. Write a C++ program to find the biggest number using command-line arguments. 	15	Demonstration
V	<ol style="list-style-type: none"> 1. Write a C++ program to demonstrate class templates. 2. Write a C++ program to demonstrate function templates. 3. Write a C++ program to demonstrate exception handling. 	15	Hands-on Training

Learning Outcome Based Education & Assessment (LOBE)							
Formative Examination - Blue Print							
Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CIAI	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA	No. of Questions to be asked		2	2	2	2	2
	No. of Questions to be answered		2	2	2	2	2
	Marks for each question		2.5	2.5	2.5	2.5	2.5
	Total Marks for each section		5	5	5	5	5

Distribution of Marks with K Level CIA									
	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
	K4					5	5	20	20
	Marks						25	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S. No.	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
1	CO1	K1	15				
2	CO2	K2		15			
3	CO3	K3			15		
4	CO4	K3				15	
5	CO5	K4					15
Question Pattern	No. of Questions to be asked		2	2	2	2	2
	No. of Questions to be answered		2	2	2	2	2
	Marks for each question		7.5	7.5	7.5	7.5	7.5
	Total Marks for each section		15	15	15	15	15

Distribution of Marks with K Level

K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15	15		30	40	40
K4					15	15	20	20
Marks						75	100	100



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	INTRODUCTION TO DATA SCIENCE			
Course Code	23UCAEC21	L	P	C
Category	CORE ELECTIVE	4	-	3
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ To learn about the basics of Data Science and Big Data.➤ To learn about the overview and building process of Data Science.➤ To learn about various algorithms in Data Science.➤ To learn about the Hadoop framework.➤ To learn about a case study about Data Science.				
UNIT – I Basics of Data Science				12
Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science.				
UNIT - II Data Science Process				12
The Data science process: Overview – research goals – retrieving data - transformation – Exploratory Data Analysis – Model building.				
UNIT - III Algorithms				12
Algorithms: Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised – Semi-supervised.				
UNIT - IV Hadoop				12
Introduction to Hadoop: Hadoop framework – Spark – replacing MapReduce – NoSQL – ACID – CAP – BASE – types.				
UNIT – V Case Study				12
Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation.				
Total Lecture Hours				60

BOOKS FOR STUDY:

- Davy Cielen, Arno D.B. Meysman, Mohamed Ali, 'Introducing Data Science', Manning Publications, 2016.

BOOKS FOR REFERENCES:

- Roger Peng, "The Art of Data Science," Lulu.com, 2016.
- Murtaza Haider, "Getting Started with Data Science – Making Sense of Data with Analytics," IBM Press, E-book.
- Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools," Dreamtech Press, 2016.
- Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added," 2017, 1st Edition.
- Cathy O'Neil, Rachel Schutt, "Doing Data Science: Straight Talk from the Frontline," O'Reilly Media, 2013.
- Lillian Pierson, "Data Science for Dummies," 2017, 2nd Edition.

WEB RESOURCES:

- ❖ <https://www.w3schools.com/datascience/>
- ❖ https://en.wikipedia.org/wiki/Data_science
- ❖ <http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/>

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change			No Changes Made			New Course	✓

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

COURSE OUTCOMES:**K LEVEL**

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

CO1	Understand the basics in Data Science and Big Data.	K1 to K4
CO2	Understand the overview and building process in Data Science..	K1 to K4
CO3	Understand various algorithms in Data Science.	K1 to K4
CO4	Understand the Hadoop Framework in Data Science	K1 to K4
CO5	Case study in Data Science.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

CO4	M	M	M	S	S	S	M	L	M	M
CO5	M	M	S	M	M	L	M	S	M	M
S- STRONG			M – MEDIUM				L - LOW			

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	1	2	2
CO 2	2	3	2	2	-
CO 3	3	2	2	1	1
CO 4	1	2	2	1	3
CO 5	2	2	-	3	1
WEITAGE	11	11	7	9	7
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	73	73	47	60	47

LESSON PLAN:

UNIT	Introduction to Data Science	HRS	PEDAGOGY
I	Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science.	12	Black Board/PPT
II	The Data science process: Overview – research goals – retrieving data - transformation – Exploratory Data Analysis – Model building.	12	Black Board/PPT
III	Algorithms: Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised – Semi-supervised.	12	Black Board/PPT
IV	Introduction to Hadoop: Hadoop framework – Spark – replacing MapReduce – NoSQL – ACID – CAP – BASE – types.	12	Black Board/PPT
V	Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation.	12	Black Board/PPT

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

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of Questions	K - Level		
CI	CO1	K1 – K4	2	K1,K2	2(K3)	2(K4)
AI	CO2	K1 – K4	2	K1,K2	2(K3)	2(K4)
CI	CO3	K1 – K4	2	K1,K2	2(K3)	2(K4)
AII	CO4	K1 – K4	2	K1,K2	2(K3)	2(K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1-K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1-K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1-K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1-K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice)	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

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

Answer ALL the questions				PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3		
OR					
11. b)	Unit - I	CO1	K3		
12. a)	Unit - II	CO2	K3		
OR					
12. b)	Unit - II	CO2	K3		
13. a)	Unit - III	CO3	K3		
OR					
13. b)	Unit - III	CO3	K3		
14. a)	Unit - IV	CO4	K3		
OR					
14. b)	Unit - IV	CO4	K3		
15. a)	Unit - V	CO5	K3		
OR					
15. b)	Unit - V	CO5	K3		

Answer ALL the questions				PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K4		
OR					
16. b)	Unit - I	CO1	K4		
17. a)	Unit - II	CO2	K4		
OR					
17. b)	Unit - II	CO2	K4		
18. a)	Unit - III	CO3	K4		
OR					
18. b)	Unit - III	CO3	K4		
19. a)	Unit - IV	CO4	K4		
OR					
19. b)	Unit - IV	CO4	K4		
20. a)	Unit - V	CO5	K4		
OR					
20. b)	Unit - V	CO5	K4		



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	UNDERSTANDING INTERNET			
Course Code	23UCANM21	L	P	C
Category	NME	2	-	2
COURSE OBJECTIVES:				
<ul style="list-style-type: none">➤ Knowledge of Internet medium.➤ Internet as a mass medium.➤ Features of Internet Technology.➤ Internet as source of infotainment.➤ Study of internet audiences and about cyber-crime.				
UNIT - I Emergence of Internet				06
The emergence of internet as a mass medium – the world of world wide web.				
UNIT - II Features of Internet				06
Features of internet as a technology.				
UNIT - III Classification				06
Internet as a source of infotainment – classification based on content and style.				
UNIT - IV Effect of Internet				06
Demographic and psychographic descriptions of internet-audiences – effect of internet on the values and life - styles.				
UNIT - V Issues and Possibilities				06
Present issues such as cyber-crime and future possibilities.				
Total Lecture Hours				30

BOOKS FOR STUDY:

- Barnouw.E and Krishnaswamy S [1990], Indian Film, New York, OUP.
- Kumar, Keval [1999] Mass Communication in India. Mumbai, Jaico.
- Srivastava, KM [1992] Media Issues. Sterling Publishers Pvt Ltd.

BOOKS FOR REFERENCES:

- Acharya, RN [1987] Television in India. Manas Publications, New Delhi.
- Barnouw, E [1974] Documentary – A History of Non-fiction. Oxford, OUP
- Luthra, HR [1986] Indian Broadcasting. Ministry of I & B, New Delhi.
- Vasudev, Aruna [1986] The New Indian Cinema. Macmillan India, New Delhi.

WEB RESOURCES:

- ❖ <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf>
- ❖ <https://www.w3schools.com/html/default.asp>

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

COURSE OUTCOMES:**K LEVEL**

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

CO1	Knows the basic concept in internet Concept of mass medium and world wide web.	K1 to K2
CO2	Knows the concept of internet as a technology.	K1 to K2
CO3	Understand the concept of infotainment and classification based on content And style.	K1 to K2
CO4	Can be able to know about Demographic and psychographic description of Internet.	K1 to K2
CO5	Understand the concept of cyber-crime and future possibilities.	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:

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

CO / PO MAPPING:

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

LESSON PLAN:

UNIT	UNDERSTANDING INTERNET	HRS	PEDAGOGY
I	The emergence of internet as a mass medium – the world of world wide web.	6	Black Board/PPT
II	Features of internet as a technology.	6	Black Board/PPT
III	Internet as a source of infotainment – classification based on content and style.	6	Black Board/PPT
IV	Demographic and psychographic descriptions of internet-audiences – effect of internet on the values and life - styles.	6	Black Board/PPT
V	Present issues such as cyber-crime and future possibilities.	6	Black Board/PPT

**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	
			No. of. Questions	K - Level
CI AI	CO1	K1 – K2	25	K1,K2
	CO2	K1 – K2	25	K1,K2
CI AII	CO3	K1 – K2	25	K1,K2
	CO4	K1 – K2	25	K1,K2
Question Pattern CIA I & II		No. of Questions to be asked	50	
		No. of Questions to be answered	50	
		Marks for each question	1	
		Total Marks for each section	50	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	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	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ADVANCED EXCEL LAB			
Course Code	23UCASP21	L	P	C
Category	SKILL ENHANCEMENT	2	-	2

COURSE OBJECTIVES:

- Handle large amounts of data
- Aggregate numeric data and summarize into categories and subcategories
- Filtering, sorting, and grouping data or subsets of data
- Create pivot tables to consolidate data from multiple files
- Presenting data in the form of charts and graphs

S. No	List of Programs	Hours
1	Use Excel functions like SUM, AVERAGE, MAX, and MIN to calculate totals, averages, and other basic statistics.	
2	Set up data validation rules to control data input and prevent errors in your spreadsheet.	
3	Create simple bar charts, line charts, and pie charts to visualize data trends.	
4	Filter and Sort data to quickly find information in large datasets.	
5	Write basic IF statements to perform conditional calculations in your spreadsheet.	
6	Create data tables to perform sensitivity analysis or to display multiple scenarios of a calculation.	
7	Practice text functions like CONCATENATE, LEFT, RIGHT, and TRIM to clean and manipulate text data.	
8	Use functions like VLOOKUP and HLOOKUP to search for and retrieve specific data from a table.	
9	Build a PivotTable to summarize and analyze data from a large dataset.	
10	Apply conditional formatting rules to highlight specific data based on certain criteria.	
11	Use Subtotal function to group and summarize data in a list.	
12	Use date and time functions to calculate dates, durations and time differences	
Total Lecture Hours		30

BOOKS FOR STUDY:

- M Alexander ,Microsoft Excel 365 BIBLE,2022,Wiley

BOOKS FOR REFERENCES:

- Wanyne. L. Winston, Market Analytics Data Driven Technique with Microsoft Excel,2014
- PunitPrabhu, Data Analytics with Excel,2019
- Manisha Nigam, Advanced Analytics with Excel, 2019, BPB Publications

WEB RESOURCES:

- ❖ <https://www.coursera.org/learn/excel-data-analysis>
- ❖ <https://www.udemy.com/course/data-analytics-in-excel/>

COURSE OUTCOMES:**K LEVEL**

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

CO1	Remember the syntax and semantics.	K1 to K4
CO2	Understand the programming principles.	K1 to K4
CO3	Apply the principles learned in real-time problems.	K1 to K4
CO4	Analyze the various methods of solving a problem and choose the best method.	K1 to K4
CO5	Code, debug, and test the programs with appropriate test cases.	K1 to K4

MAPPING WITH PROGRAM OUTCOMES:

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

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

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	2	2	2
CO 2	3	3	3	2	3	2
CO 3	3	2	2	3	3	3
CO 4	3	2	3	3	3	3
CO 5	3	3	2	3	3	3
WEITAGE	15	12	14	13	14	13
WEIGHTED PERCENTAGE	100%	80%	93%	100%	93%	86%

OF COURSE CONTRIBUTION TO POS						
S. No	List of contents	HRS	PEDAGOGY			
1	Use Excel functions like SUM, AVERAGE, MAX, and MIN to calculate totals, averages, and other basic statistics.	30	Demonstration Hands-on Training			
2	Set up data validation rules to control data input and prevent errors in your spreadsheet.					
3	Create simple bar charts, line charts, and pie charts to visualize data trends.					
4	Filter and Sort data to quickly find information in large datasets.					
5	Write basic IF statements to perform conditional calculations in your spreadsheet.					
6	Create data tables to perform sensitivity analysis or to display multiple scenarios of a calculation.					
7	Practice text functions like CONCATENATE, LEFT, RIGHT, and TRIM to clean and manipulate text data.					
8	Use functions like VLOOKUP and HLOOKUP to search for and retrieve specific data from a table.					
9	Build a PivotTable to summarize and analyze data from a large dataset.					
10	Apply conditional formatting rules to highlight specific data based on certain criteria.					
11	Use Subtotal function to group and summarize data in a list.					
12	Use date and time functions to calculate dates, durations and time differences					

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
CIAI	CO1	K1	5				
	CO2	K2		5			
	CO3	K3			5		
	CO4	K3				5	
	CO5	K4					5
Question Pattern CIA	No. of Questions to be asked		2	2	2	2	2
	No. of Questions to be answered		2	2	2	2	2
	Marks for each question		2.5	2.5	2.5	2.5	2.5
	Total Marks for each section		5	5	5	5	5

Distribution of Marks with K Level CIA									
	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
CIA	K1	5					5	20	20
	K2		5				5	20	20
	K3			5	5		10	40	40
	K4					5	5	20	20
	Marks						25	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	Cos	K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding & Implementation	Debugging & Output
1	CO1	K1	15				
2	CO2	K2		15			
3	CO3	K3			15		
4	CO4	K3				15	
5	CO5	K4					15
Question Pattern	No. of Questions to be asked		2	2	2	2	2
	No. of Questions to be answered		2	2	2	2	2
	Marks for each question		7.5	7.5	7.5	7.5	7.5
	Total Marks for each section		15	15	15	15	15

Distribution of Marks with K Level								
K Level	Syntax & Semantics	Programming principles	Concept Applications	Coding	Debugging & Output	Total Marks	% of (Marks without choice)	Consolidated %
K1	15					15	20	20
K2		15				15	20	20
K3			15	15		30	40	40
K4					15	15	20	20
Marks						75	100	100