



HAJEE KARUTHA ROWTHER HOWDLA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

Re-Accredited with A++ Grade by NAAC (3rd Cycle)

Uthamapalayam - 625 533.

DEPARTMENT OF INFORMATION TECHNOLOGY

BACHELOR OF SCIENCE – INFORMATION TECHNOLOGY

SYLLABUS

Choice Based Credit System – CBCS

With

Outcome Based Education (OBE)

(Academic Year 2026 - 2027 onwards)

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College Vision and Mission

Vision

Our vision is to provide the best type of higher education to all, especially to students hailing from minority Muslim community, rural agricultural families and other deprived, under privileged sections of the society, inculcating the sense of social responsibility in them. Our college is committed to produce talented, duty-bound citizens to take up the challenges of the changing times.

Mission

Our mission is to impart and inculcate social values, spirit of service and religious tolerance as envisioned by our beloved Founder President Hajee Karutha Rowther.

The Vision beckons the Mission continues forever.

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Department Vision and Mission

Vision

To transform the students into good citizens and develop them to lead the country as IT professionals

Mission

- ✓ To provide the practical skill in developing the simple applications.
- ✓ To enrich the student's knowledge in the recent trends that the industry is seeking for.
- ✓ To impart comprehensive knowledge with equal emphasis on theory and practices.
- ✓ To enhance the employability, the students are to be stimulated to work in a team

Programme Educational Objectives (PEO)

Our graduates will be progressive, efficient, value based, academically excellent, creative, collaborative, empowered and globally competent literates with the skills required for societal change.

They will demonstrate

PEO1	Comprehensive knowledge and expertise, employability, the acumen of creative and critical thinking, the spirit of enquiry and professional attitude required for a successful career
PEO2	Accountability, linguistic competence and communication skills in the work environment and beyond
PEO3	Perseverance, effective collaboration, team spirit, leadership and problem solving skills
PEO4	Keen sense of civility, professional ethics, receptivity and moral righteousness
PEO5	Commitment to address social and environmental threats and to act as responsible service-minded, duty-bound global citizens

Programme Outcomes (PO)

On the completion of (after three years) of B.Sc., Automatic construction of efficient parsers Information Technology programme, the students can achieve

PO1	Apply knowledge of mathematics, computer fundamentals to IT applications.
PO2	Ability to use a range of programming languages and tools to develop computer programs to solve problems effectively
PO3	Identify, design and analyses complex computer concepts, implementing and interpret the result.
PO4	Select and apply current technology skills and tools accessory for computing practices and integrate IT based solutions into the user environment effectively
PO5	Communicate effectively with a range of audience using a range of modalities including oral, written and graphical

Program Specific Objectives (PSO)

The graduate will

PSO1	Excel themselves as Software Engineers, System Analyst, Tester, Developer etc and acquire the leadership qualities
PSO2	Get specialization in the course through their Master's Degree
PSO3	Promote the students with cumulative skill set to provide solutions to a given real world problem using current trends and technology.
PSO4	Students will be equipped with the life-long learning process for self-sustainability, employability and leadership roles in our dynamic society
PSO5	Deliver a new generation with proficient on fundamental knowledge and recent trends on different disciplines in Information Technology.

Programme Scheme

Eligibility

A Pass in +2 examination conducted by Board of Higher Secondary Education, Government of Tamilnadu or equivalent with Mathematics as one of the subjects.

For Programme Completion

A Candidate shall complete:

- Part I - Language Courses – Tamil/Arabic/Malayalam in semesters I, II, III and IV respectively
- Part II - Language Courses - English in semesters I, II, III, IV respectively
- Part III - Core Courses in semesters I, II, III, IV, V and VI respectively
- Part III - Generic Elective Courses in semesters I, II, III and IV respectively
- Part III - Discipline Elective Courses in semesters IV, V and VI respectively
- Part IV - Foundation Course (Skill Enhancement Course) in Semester I
- Part IV - Entrepreneurial Skills (Skill Enhancement Course) Course in Semester III
- Part IV - Professional Competency Skill (Skill Enhancement Course) Course in Semester V
- Part IV – Non Major Elective (Skill Enhancement Course) Courses in Semesters V and VI respectively
- Part IV - Environmental Studies Course in semester I
- Part IV - Value Education Course in semester III
- Part IV - Summer Internship/Industrial Training Course in semester V
- Part V - Extension activity in semester IV

Scheme of Examinations under Choice Based Credit System

Term End Examinations (TEE)	- 75 Marks
Continuous Internal Assessment Examinations (CIAE)	- 25 Marks
Total	- 100 Marks

Pattern of Continuous Internal Assessment Examinations (CIAE)

Average of Two Internal Tests (each 20 marks)	- 20 Marks
Assignment	- 05 Marks
Total	- 25 Marks

Pattern of Term End Examinations

(Max. Marks: 75 / Time: 3 Hours)

External Examinations Question Paper Pattern for Part I & III and Part IV (Non- Major Elective & Skill based Subject)

Section – A (5 X 1 = 5 Marks)

Answer ALL questions.

- Questions 1 - 5
- One question from each unit
- Multiple choice questions and each question carries Four choices

Section – B (5 X 2 = 10 Marks)

Answer ALL questions.

- Questions 6 - 10
- One question from each unit
- Short Answer (Definition)

Section – C (5 X 6 = 30 Marks)

Answer any ALL questions (Choose either a or b).

- Questions 11 - 15
- One question from each unit

- Paragraph

Section – D (3 X 10 = 30 Marks)

Answer any THREE out of five questions.

- Questions 16 - 20
- One question from each unit
- Essay type

**External Examinations Question Paper Pattern for Part IV-
 Foundation Course**

- MCQ Pattern (1 X 75 = 75 Marks)

**External Examinations Question Paper Pattern for Part IV-
 Environmental Studies and Value Education**

Section – A: (5 X 6 = 30 Marks)

Answer ALL questions choosing either A or B.

- Questions 1 - 5
- Two questions from each unit (either.... or.... type)
- Paragraph

Section – B (3 X 15 = 45 Marks)

Answer any THREE out of five questions.

- Questions 6 – 10
- One question from each unit
- Essay type

Part V (Extension Activities) – 13 Activities

- Internal Evaluation

Passing Marks

Minimum 27 for External Exam

Eligibility for the degree – passing minimum is **40%**

Practical Examination

- Internal – 40 marks
- External – 60 marks (minimum 24 marks)
- Total – 100 marks
- Passing minimum is **40%**

Weightage

Weightage for Bloom's Taxonomy	Percentage	Marks	
		CIAE	TEE
Knowledge (Remembering) – K1	15	4	11
Understanding – K2	20	5	15
Applying – K3	25	6	19
Analyzing – K4	40	10	30
Gross Total	100	25	75

Assessment

Distribution of questions and marks for Continuous Internal Assessment Examinations

Bloom's Taxonomy	Section A	Section B	Section C	Section D	Total
Knowledge(K1)	2(2)	2(2)	-	-	25 marks
Understanding(K2)	Assignment (5)				
Apply(K3)	-	-	2(6)	-	
Analyzing (K4)	-	2(2)	-	1(8)	

Distribution of questions and marks for Term End Examinations.

Bloom's Taxonomy	Section A	Section B	Section C	Section D	Total
Knowledge(K1)	1(1)	2(4)	1(6)	-	Total 75 Marks
Understanding(K2)	1(1)	1(2)	2(12)	-	
Apply(K3)	3(3)	2(4)	2(12)	-	
Analyzing (K4)	-	-	-	3(30)	

Note: Figures in parenthesis are Marks

Credits Distribution

S. No	Part	Category	No of Courses	No of Credits
1	Part - I	Language	4	12
2	Part - II	English	4	12
3	Part - III	Core (Theory / Practical / Project)	17	69
		Discipline Elective (Theory / Practical)	4	14
		Generic Elective (Theory / Practical *)	6	16
4	Part - IV (AEC)	Foundation Course	1	2
		EVS	1	2
		Value Education	1	2
		NME	2	4
5	Part - IV (SEC)	Entrepreneurial Skills	1	2
		Professional Competency	1	2
		Internship	1	2
6	Part - V	Extension Activity	1	1
Total			44	140

* Generic Elective Practical Examinations should be Conducted only in Even Semester

B.SC INFORMATION TECHNOLOGY
Details of Course Category, Code, Credits & Title

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
Semester - I							
Part - I							
Language - I	26UTALL11	பொதுத்தமிழ் - I	6	25	75	100	3
	26UARLL11	Introduction to Arabic Language - I					
	26UMMLL11	History of Malayalam Literature					
Part - II							
English - I	26UENLL11	General English - I	6	25	75	100	3
Part - III							
Core - I	26UCTCC11	Programming in C	5	25	75	100	5
Core - II (Lab)	26UCTCC1P	Programming in C Lab	4	40	60	100	3
Generic Elective - I	26UCTGE11	Digital Logic	3	25	75	100	3
Generic Elective - II(Lab)	26UCTGE2P	Data Structures Lab	2	-	-	-	-
Part - IV							
Foundation Course (SEC)(MCQ)	26UCTFN11	Fundamentals of Computers	2	25	75	100	2
EVS	26UGEVS11	Environmental Studies	2	25	75	100	2
TOTAL			30				21

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max. Marks	Credits
Semester - II							
Part - I							
Language - II	26UTALL21	பொதுத்தமிழ் - II	6	25	75	100	3
	26UARLL21	Introduction to Arabic Language - II					
	26UMMLL21	Prose, Composition & Translation					
Part - II							
English - II	26UENLL21	General English - II	6	25	75	100	3
Part - III							
Core - III	26UCTCC21	Object Oriented Programming with C++	5	25	75	100	5
Core - IV (Lab)	26UCTCC2P	OOPs with C++ Lab	4	40	60	100	4
Core - V	26UCTCC22	Data Structures	3	25	75	100	3
Generic Elective - II	26UCTGE21	Mathematical Foundations	4	25	75	100	3
Generic Elective - II(Lab)	26UCTGE2P	Data Structures Lab	2	40	60	100	2
TOTAL			30				23

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTCC11	PROGRAMMING IN C	Core - I	5	5	25	75	100

Course Objectives

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C.

UNIT	Contents	No. of Hours
I	Overview of C: History of C - Importance of C - Basic Structure of C - Programming Style. Contents, Variables and Data Types - Declaration of Variables, Storage Class- Defining Symbolic Constants - Declaring a Variable as Constant, Volatile - Overflow and Underflow of Data. Operator and expressions: Arithmetic, Relational, Logical, Assignment, Increment & Decrement, Conditional, Bitwise and Special Operators – Arithmetic Expression – Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expression – Operator Precedence and Associativity – Mathematical Functions. Managing I/O Operations: Reading and Writing a Character – Formatted Input, Output.	10
II	Decision Making and Branching: If Statement, If... Else Statement - Nesting of If...Else Statement – Else..If Ladder – Switch Statement – The? Operator - Goto Statement – Decision making and Looping: The While Statement – Do Statement – The for Statement –Jumps in Loops.	15
III	Arrays and Strings: One Dimensional Array – Declaration, Initialization – Two Dimensional Arrays – Multi Dimensional Array – Initialization – Dynamic Arrays. Strings: Declaration, Initialization of String Variables – Reading and Writing String – Arithmetic Operations on Strings – Putting Strings Together – Comparison – String Handling Function – Table of String – Features of String.	20
IV	Functions, Structure and Unions: Need – Multi Function Program – Elements of User Defined Functions – Definition – Return Values and their Types – Function Calls, Declaration, Category of all Types of Arguments and Return Values – Nesting of Functions – Recursion – Passing Arrays, Strings to Functions – Scope Visibility and Life Time of Variables – Multi File Programs. Structure and Unions: Introduction - Defining Structure – Declaring Structure Variables – Accessing Structure Members – Initialization – Union.	15
V	Pointers and Files: Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring Pointers Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer. Files: Defining Opening, Closing a File. I/O Operation on Files – Error Handling During I/O Operations – Random Access to File – Command Line Arguments.	15
	Total	75

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Writing C Program structure and to declare the variables, constants, operators and expressions.	K1, K2
2	Developing conditional, iterative statements in C language.	K1, K2, K3
3	Discussing about Arrays and Strings.	K1, K2, K3
4	Applying Functions, Structures and Unions in C language.	K1, K2, K3, K4
5	Utilizing Pointers and File Handling in C language.	K1, K2, K3, K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	E. Balagurusamy, <i>Programming in ANSI C</i> , TMH Company, 6th Edition.	
Reference Books		
1.	Byson. S, Gottfried, <i>Programming in C</i> , TMH Company, Schaums Outline Series, 2008, 2nd Edition.	
2.	Kernighan B.W. & Ritchie. D.M, <i>The C Programming Language</i> , Prentice Hall of India, 2002, 2nd Edition.	
e-Resources		
1.	http://www.tutorialspoint.com/cprogramming/	
2.	http://www.programmingsimplified.com/c-program-examples	

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	3	3	3
C02	2	3	2	3	3
C03	3	3	3	2	3
C04	2	2	1	2	1
C05	3	1	1	1	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	1	1	2	2	2
C02	1	2	1	2	3
C03	2	3	2	2	3
C04	1	2	2	3	2
C05	2	3	2	3	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	History of C - Importance of C - Basic Structure of C - Programming Style.	2
1.2	Contents, Variables and Data Types - Declaration of Variables, Storage Class- Defining Symbolic Constants - Declaring a Variable as Constant, Volatile - Overflow and Underflow of Data.	3
1.3	Operator and expressions: Arithmetic, Relational, Logical, Assignment, Increment & Decrement, Conditional, Bitwise and Special Operators – Arithmetic Expression- Evaluation of Expressions- Precedence of Arithmetic Operators – Type Conversions in Expression – Operator Precedence and Associatively – Mathematical Functions.	3
1.4	Managing I/O Operations: Reading and Writing a Character – Formatted Input, Output.	2
UNIT - II		
2.1	If Statement, If... Else Statement - Nesting of If....Else Statement – Else..If Ladder	5
2.2	Switch Statement – The ?: Operator – Goto Statement	3
2.3	Decision making and Looping: The While Statement – Do Statement	2
2.4	The For Statement –Jumps in Loops.	5
UNIT - III		
3.1	One Dimensional Array – Declaration, Initialization – Two Dimensional Arrays – Multi Dimensional Array – Initialization. Dynamic Arrays.	7
3.2	Strings: Declaration, Initialization of String Variables – Reading and Writing String	3
3.3	Arithmetic Operations on Strings – Putting Strings Together – Comparison – String Handling Function	7
3.4	Table of String – Features of String	3
UNIT - IV		
4.1	Need – Multi Function Program – Elements of User Defined Functions – Definition – Return Values and their Types	5
4.2	Function Calls, Declaration, Category of all Types of Arguments and Return Values – Nesting of Functions	3
4.3	Recursion – Passing Arrays, Strings to Functions – Scope Visibility and Life Time of Variables – Multi File Programs.	3
4.4	Structure and Unions: Introduction - Defining Structure – Declaring Structure Variables – Accessing Structure Members – Initialization – Union.	4
UNIT - V		
5.1	Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring Pointers Variables	5

5.2	Initialization of Pointer Variables – Accessing a Variable Through its Pointer	4
5.3	Files: Defining Opening, Closing a File. I/O Operation on Files – Error Handling During I/O Operations	4
5.4	Random Access to File – Command Line Arguments	2
Total		75

Course Designer

Name: K.A. Sheik Fareed

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTCC1P	PROGRAMMING IN C LAB	Core - II	4	3	40	60	100

Course Objectives

On successful completion of this subject the students have the programming ability in C Language.

UNIT	Contents	No. of Hours
I	Program using Library Functions Program using for-loop Program using while loop Program using do-loop	15
II	Program using nested if-else. Program using "Switch".	10
III	Program using user-defined Functions Program using Recursive Function Program using Recursive Function Program implementing Two-dimensional Array	15
IV	Program to process Strings Program using pointer Program implementing structure	10
V	Program to process files Program with command-line arguments	10
	Total	60

Course Outcomes

Knowledge Level

CO	On completion of this course, students will	
1	Understand the basic concepts of C programming and looping Structure	K1, K2, K3
2	Understand the basic concepts of C programming and looping Structure	K1, K2, K3
3	Apply the functions & Arrays in C programming	K1, K2
4	Understand and apply the Strings & Pointers	K1, K2, K3, K4
5	Understand and apply the Files and command line	K1, K2, K3, K4

K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze

Textbooks

1. E. Balagurusamy, *Programming in ANSI C*, TMH Company, 6th Edition.

Reference Books

1. Byson. S, Gottfried, *Programming in C*, TMH Company, Schaums Outline Series, 2008, 2nd Edition.
2. Kernighan B.W. & Ritchie. D.M, *The C Programming Language*, Prentice Hall of India, 2002, 2nd Edition.

e-Resources

1. <http://www.programiz.com/c-programming>.

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	3	3	2	1
C04	3	2	1	2	1
C05	3	2	3	2	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	2	3
C02	3	2	2	3	2
C03	3	3	3	2	1
C04	3	2	1	2	1
C05	3	2	3	2	1

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LAB SCHEDULE

Module No.	Topic	No. of Hours
UNIT - I		
1.1	Program using Library Functions	3
1.2	Program using for-loop	5
1.3	Program using while loop	2
1.4	Program using do-loop	5
UNIT - II		
2.1	Program using nested if-else	5
2.2	Program using Recursive Function	5
UNIT - III		
3.1	Program using user-defined Functions	2
3.2	Program using Recursive Function	3
3.3	Program implementing One-dimensional Array	5
3.4	Program implementing Two-dimensional Array	5
UNIT - IV		
4.1	Program to process Strings	3
4.2	Program using pointer	4
4.3	Program implementing structure	3
UNIT - V		
5.1	Program to process files	5
5.2	Program with command-line arguments	5
Total		60

Course Designer

Name: K.A. Sheik Fareed

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTGE11	DIGITAL LOGIC	Generic Elective - I	3	3	25	75	100

Course Objectives							
Digital logic deals with binary signals and logic circuits that form the foundation of modern digital systems.							
UNIT	Contents						No. of Hours
I	Number Systems and Codes: Number System–Base Conversion–Binary Codes–Code Conversion. Digital Logic: Logic Gates – Truth Tables–Universal Gates.						9
II	Boolean Algebra: Laws and Theorems – SOP, POS Methods. Simplification of Boolean Functions –Using Theorems, K-Map, Binary Arithmetic: Binary Addition–Subtraction–Arithmetic Building Blocks–Adder–Subtractor.						9
III	Combinational Logic: Multiplexers– De-multiplexers Decoders– Encoders						9
IV	Sequential Logic: RS, JK, D, and T Flip- Flops–Master Slave Flip-Flops. Registers: Shift Registers–Types of Shift Registers.						9
V	Counters: Asynchronous and Synchronous Counters–Ripple, Mod, Up-Down Counters–Ring Counters.						9
Total						45	
Course Outcomes						Knowledge Level	
CO	On completion of this course, students will						
1	Identify the Number System logic gates and their functionality.						K1,K2,K3
2	Understand the Boolean functions and Simplify the Expression.						K1,K2,K3
3	Understand the functions of combinational Logic circuits.						K1,K2,K3
4	Understand the functions of Sequential Logic circuits.						K1,K2,K3,K4
5	Perform Counter design and learn its operations.						K1,K2,K3,K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze							
Textbooks							
1.	V.Rajaraman and T.Radhakrishnan, <i>Digital Computer Design</i> , Prentice Hall of India, 2001.						
2.	D.P.Leach and A.P.Malvino, <i>Digital Principles and Applications</i> –TMH– Fifth Edition–2002.						
Reference Books							
1.	M.Moris Mano, <i>Digital Logic and Computer Design</i> , PHI, 2001.						
2.	T.C.Bartee, <i>Digital Computer Fundamentals</i> , 6th Edition, Tata Mc Graw Hill,1991.						
e-Resources							
1.	Web resources from NDL Library, E-content from open-source libraries.						

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	2	3	2	3
C02	3	3	3	3	3
C03	3	3	2	3	3
C04	3	3	3	3	3
C05	3	2	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	2	3	2	3
C02	3	3	2	3	3
C03	3	2	3	3	3
C04	2	3	3	2	3
C05	3	2	3	2	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Number Systems and Codes.	1
1.2	Base Conversion	1
1.3	Binary Codes	1
1.4	Code Conversion	1
1.5	Logic Gates	2
1.6	Universal Gates	2
1.7	Truth Tables	1
UNIT - II		
2.1	Boolean Algebra: Laws and Theorems.	1
2.2	SOP, POS Methods	2
2.3	Simplification of Boolean Functions Using Theorems	1
2.4	Simplification of Boolean Functions Using K-Map	2
2.5	Binary Arithmetic: Binary Addition-Subtraction	1
2.6	Arithmetic Building Blocks - Adder	1
2.7	Arithmetic Building Blocks - Subtractor	1
UNIT - III		
3.1	Combinational Logic: Multiplexers.	3
3.2	De-multiplexers.	2
3.3	Decoders.	2

3.4	Encoders.	2
UNIT - IV		
4.1	Sequential Logic: RS Flip Flops	1
4.2	JK Flip Flops	1
4.3	D Flip Flops	1
4.4	T Flip- Flops	1
4.5	Master Slave Flip-Flops	2
4.6	Shift Registers–Types of Shift Registers.	3
UNIT - V		
5.1	Counters: Asynchronous and Synchronous Counters	2
5.2	Ripple Counters	2
5.3	Mod Counters	1
5.4	Up-Down Counters	2
5.5	Ring Counters	2
Total		45

Course Designer

Name: A.K. JENARTHANAN

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTFN11	FUNDAMENTALS OF COMPUTERS	Foundation Course (SEC)(MCQ)	2	2	25	75	100

Course Objectives		
Students are able to learn about the fundamentals of computers and know how to use it and to learn its computing concepts.		
UNIT	Contents	No. of Hours
I	Understanding the computer: Introduction-Evolution of Computers-Generation of Computers-Classification of Computers-Computing concepts-The computer system -Application of Computers.	6
II	Computer Organisation and Architecture: Introduction-Central Processing Unit- Internal Communications- Machine Cycle – The Bus – Instruction Set.	6
III	Memory and Storage Systems: Introduction-Memory representation-Random Access Memory– Read only memory – Storage Systems-Magnetic Storage Systems - Optical Storage systems – Magneto Optical systems – Solid state Storage Devices – Storage Evaluation Criteria.	6
IV	Input Devices: Keyboard- Pointing Devices – Scanning Devices _ Optical Recognition Devices – Digital Camera – Voice Recognition System – Data Acquisition Sensors – Media Input Devices. Output Devices: Display monitors-Printers – Plotters – Voice output systems – Projectors- Terminals.	6
V	Computer Software: Introduction – Types of Computer Software – System Management Programs- System Development Programs- Standard Application Programs- Unique Application Programs – Problem Solving – Structuring the Logic – Using the computer.	6
Total		30
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	To know about the Evolution of Computers, Generation of Computers and Computing concepts	K1, K2
2	To learn about Computer Organization and Architecture and internal communications.	K1, K2
3	How to store the data in computers and to know the storage systems.	K1, K2
4	To learn the types of input devices and output devices and how to use it in computers.	K1,K2,K3,K4

5	To know the types of computer software and system development programs.	K1,K2,K3,K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbook		
1.	E Balagurusamy, " <i>Fundamentals of computers</i> ", Mc Graw Hill Education 2013.	
Reference Books		
1.	Rajaraman, " <i>Fundamentals of computers</i> ", PHI Learning Ltd, Fifth Edition.	
2.	Pradeep K.Sinha, PritiSinha " <i>Computer Fundamentals</i> ", Sixth edition, BPB Publications.	

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	1	3	3
C02	3	2	3	2	3
C03	3	3	2	3	2
C04	3	2	2	2	3
C05	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	1	3	3
C02	3	2	3	2	3
C03	3	3	2	3	2
C04	3	2	2	2	3
C05	3	3	3	3	3

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Evolution of Computers	1
1.2	Generation of Computers	1
1.3	Classification of Computers	1
1.4	Computing concepts	1
1.5	The computer system	1
1.6	Application of Computers.	1
UNIT - II		
2.1	Introduction	1
2.2	Central Processing Unit	1
2.3	Internal Communications	1

2.4	Machine Cycle ,The Bus	2
2.5	Instruction Set.	1
UNIT - III		
3.1	Introduction-Memory representation	1
3.2	Random Access Memory	1
3.3	Read only memory	1
3.4	Storage Systems-Magnetic Storage Systems	1
3.5	Optical Storage systems, Magneto Optical systems	1
3.6	Solid state Storage Devices, Storage Evaluation Criteria.	1
UNIT - IV		
4.1	Keyboard- Pointing Devices	1
4.2	Scanning Devices _ Optical Recognition Devices	1
4.3	Digital Camera – Voice Recognition System	1
4.4	Data Acquisition Sensors – Media Input Devices- Display monitors	1
4.5	Printers – Plotters – Voice output systems – Projectors- Terminals.	2
UNIT - V		
5.1	Types of Computer Software -- Standard Application Programs	2
5.2	System Management Programs- System Development Programs	1
5.3	Unique Application Programs – Problem Solving	1
5.4	Structuring the Logic	1
5.5	Using the computer.	1
Total		30

Course Designer

Name: Ms. R. Neshana

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTCC21	OBJECT ORIENTED PROGRAMMING WITH C++	Core- III	5	5	25	75	100

Course Objectives		
Learn the fundamentals of input and output using the C++ library. Design a class that serves as a program module or package. Understand and demonstrate the concepts of Functions, Constructor and inheritance.		
UNIT	Contents	No. of Hours
I	Principles of Object Oriented Programming: Procedure Oriented Programming - Object Oriented Programming Paradigm - Basic concepts and benefits of OOP - Object Oriented Languages - Structure of C++ Program - Tokens, Keywords, Identifiers, Constants, Basic data type, User-defined Data type, Derived Data type – Symbolic Constants – Declaration of Variables – Dynamic Initialization - Reference Variable – Operators in C++ - Scope resolution operator – Memory management Operators – Manipulators – Type Cast operators – Expressions and their types – Conversions – Operator Precedence - Control Structures	13
II	Functions in C++: Function Prototyping - Call by reference - Return by reference - Inline functions - Default, const arguments - Function Overloading – Friend and virtual functions - Classes and Objects: Member functions - Nesting of member functions - Private member functions - Memory Allocation for Objects - Static Data Members - Static Member functions - Array of Objects - Objects as function arguments - Returning objects - friend functions – Const Member functions.	15
III	Constructors and Destructors: Parameterized Constructors - Multiple Constructors in a class - Constructors with default arguments - Dynamic initialization of objects - Copy and Dynamic Constructors - Destructors - Operator Overloading - Overloading unary and binary operators – Overloading Using Friend functions – manipulation of Strings using Operators – Rules of operator Overloading – Type Conversions.	15
IV	Inheritance: Defining derived classes - Single Inheritance - Making a private member inheritable – Multilevel, Multiple inheritance - Hierarchical inheritance - Hybrid inheritance - Virtual base classes - Abstract classes - Constructors in derived classes - Member classes - Nesting of classes. - Pointers, Virtual Functions and Polymorphism: Pointer to objects – this pointer- Pointer to derived Class - Virtual functions – Pure Virtual Functions	16
V	Managing console I/O Operations- C++ Streams –Unformatted I/O-Formatted Console I/O – Managing output with manipulators.	16

	Working with Files: Opening and Closing File – File modes - File pointers and their manipulations – Sequential I/O – updating a file: Random access –Error Handling during File operations – Command line Arguments.	
	Total	75
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Recall and define fundamental concepts of object-oriented principles and character sets, tokens, keywords, identifiers, constants, variables, data types, and operators.	K1, K2, K3
2	Apply C++ programming concepts, including, functions, inline functions, function overloading, and how to declare and define classes and objects.	K1, K2, K3
3	Apply C++ programming concepts, including constructor types, function and operator overloading and type conversation.	K1, K2, K3
4	Evaluate and compare different types of inheritance in C++, including the use of virtual base classes and abstract classes for solving design problems.	K1, K2, K3, K4
5	Analyse the Console I/O operations and File concepts.	K1, K2, K3, K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	E. Balagurusamy, “ <i>Object Oriented Programming with C++</i> ”, Fourth edition, TMH, 2008 Chapters 1 to 11	
Reference Books		
1.	Robert Lafore, “ <i>Object-Oriented Programming in Turbo C++</i> ”, Galgotia Publication, Delhi	
2.	Herbert schildt, “ <i>C++ The complete References</i> ”, 4 th edition, TMH.	
e-Resources		
1.	https://www.w3schools.com/Cpp/default.asp	
2.	https://www.tutorialspoint.com/cplusplus/index.htm	

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	2	3	2	1
C02	3	3	2	3	2
C03	3	2	2	3	1
C04	3	3	2	3	2
C05	2	2	3	2	1
Strong-3	Medium-2	Low-1			

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	2	3
CO2	3	2	2	3	1
CO3	3	3	2	1	2
CO4	2	2	1	3	2
CO5	2	2	3	2	1

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Procedure Vs Object Oriented Programming Paradigm	1
1.2	Basic concepts and benefits of OOP	2
1.3	Object Oriented Languages - Structure of C++ Program	2
1.4	Tokens, Keywords, Identifiers, Constants,	2
1.5	Declaration and Initialization of Variables	1
4.6	Operators and Manipulators	1
4.7	Expressions and types Conversions, Operator Precedence	2
1.8	Control Structures	2
UNIT - II		
2.1	Function Prototyping, Call by reference, Return by reference	1
2.2	Classes and Objects: Member functions, Nesting	2
2.3	Member functions, Memory Allocation	2
2.4	Static Data Members and Static Member functions	2
2.5	Array of Objects	2
2.6	Objects as function arguments	2
2.7	Returning objects.	2
2.8	friend functions – Const Member functions	2
UNIT - III		
3.1	Constructors and Destructors:	1
3.2	Constructor types and default arguments	2
3.3	Dynamic initialization of objects	2
3.4	Copy and Dynamic Constructors, Destructors	2
3.5	Overloading, Overloading unary and binary operators	2
3.6	Overloading Using Friend functions	2
3.7	Manipulation of Strings using Operators and Rules	2
3.8	Type Conversions.	2
UNIT - IV		
4.1	Inheritance: Defining derived classes	1

4.2	Single Inheritance - Making a private member inheritable	2
4.3	Multilevel, Multiple inheritance and Hierarchical inheritance	2
4.4	Hybrid inheritance, Virtual base classes	2
4.5	Abstract classes, Constructors in derived classes	2
4.6	Member classes, Nesting of classes.	2
4.7	Pointer to objects, this pointer	2
4.8	Pointer to derived Class	1
4.9	Virtual functions and Pure Virtual Functions	2
UNIT - V		
5.1	Managing console I/O Operations-C++ Streams	2
5.2	Unformatted I/O- Formatted Console I/O	2
5.3	Managing output with manipulators.	2
5.4	Working with Files: Opening and Closing File	2
5.5	File modes, File pointers and their manipulations	2
5.6	Sequential I/O and updating a file	2
5.7	Random access -Error Handling during File operations	2
5.8	Command line Arguments.	2
Total		75

Course Designer

Name: C. SHEIK MYDEEN

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTCC2P	OOPS WITH C++ LAB	Core - IV	4	4	40	60	100

Course Objectives

- Understand and apply the Object oriented programming concepts in C++
- Develop and demonstrate the programming concepts like class, Objects, Constructors, Inheritance, Polymorphism, friend and virtual functions.

UNIT	Contents	No. of Hours
I	1. Demonstrate the basic structure of C++ Program 2. Construct the C++ program for I/O operations 3. Implementing Control structures and statements. 4. Program using Arrays, strings and enumerated Datatypes	10
II	1. Program using Call by Value and Call by Reference Method. 2. Program using Inline Function in C++. 3. Program for array of objects 4. Program for constructor and types.	12
III	1. Program using Function Overloading. 2. Program using Default Arguments 3. Program using Operator Overloading.	10
IV	1. Program using Inheritance (Single, multiple and multi-level) 2. Implementing Nesting of classes, 3. Demonstrate Abstract and Wrapper Class	14
V	1. Program using Polymorphism and Virtual Functions. 2. Program for string manipulation using File concepts. 3. Working with stream classes and templates. 4. Create and demonstrate the exception handling methods	14
Total		60

Course Outcomes

Knowledge Level

CO	On completion of this course, students will	
1	Apply the C++ programming knowledge and demonstrate simple C++ programs using I/O Operations, control structures and arrays	K1, K, K3
2	Apply C++ programming concepts, including, functions, inline functions, function overloading, and how to declare and define classes and objects.	K1, K, K3
3	Apply C++ programming concepts, including constructor types, function and operator overloading and type conversation.	K1, K, K3
4	Evaluate and compare different types of inheritance in	K1, K, K3, K4

	C++, including the use of virtual base classes and abstract classes for solving design problems.	
5	Analyse the Console I/O operations and File concepts.	K1, K2, K3, K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	E. Balagurusamy, " <i>Object Oriented Programming with C++</i> ", Fourth edition, TMH, 2008	
Reference Books		
1.	Robert Lafore, " <i>Object-Oriented Programming in Turbo C++</i> ", Galgotia Publication, Delhi	
2.	Herbert schildt, " <i>C++ The complete References</i> ", 4 th edition, TMH.	
3	<i>Data Structures using C++</i> , D.S. Malik, Thomson	
e-Resources		
1.	https://www.w3schools.com/CPP/default.asp	
2.	https://www.tutorialspoint.com/cplusplus/index.htm	

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	2	3	2	2
C02	3	3	2	3	2
C03	3	2	2	3	2
C04	3	3	2	3	2
C05	2	3	3	2	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	2	3	1	2	3
C02	3	2	2	3	1
C03	3	3	2	1	2
C04	2	2	2	3	2
C05	3	2	3	2	1

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LAB SCHEDULE

Module No.	Topic	No. of Hours
UNIT - I		
1.1	Demonstrate the basic structure of C++ Program	2
1.2	Construct the C++ program for I/O operations	2
1.3	Implementing Control structures and statements.	3
1.4	Program using Arrays, strings and enumerated Datatypes	3

UNIT - I		
2.1	Program using Call by Value and Call by Reference Method.	3
2.2	Program using Inline Function in C++.	2
2.3	Program for array of objects	3
2.4	Program for constructor and types.	4
UNIT - III		
3.1	Program using Function Overloading	3
3.2	Program using Default Arguments	2
3.3	Program using Operator Overloading.	5
UNIT - IV		
4.1	Program using Inheritance (Single, multiple and multi-level)	6
4.5	Implementing Nesting of classes,	5
4.3	Demonstrate Abstract and Wrapper Class	3
UNIT - V		
5.1	Program using Polymorphism and Virtual Functions.	4
5.2	Program for string manipulation using File concepts.	4
5.3	Working with stream classes and templates.	3
5.4	Create and demonstrate the exception handling methods	3
Total		60

Course Designer

Name: C. SHEIK MYDEEN

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTCC22	DATA STRUCTURES	Core -V	3	3	25	75	100

Course Objectives		
To understand and remember data structures algorithms and its analysis procedure to develop application.		
UNIT	Contents	No. of Hours
I	Introduction to Data Structures: Introduction – Algorithm Analysis – Problem Solving – Modular Design – Implementation Of Algorithms – Testing – Verification. Arrays: Introduction – Range Of Array – Primitive Operations – Addressing Function – One Dimensional Array – Two Dimensional Arrays – Storage Representation of 2D Arrays – Multi Dimensional Arrays.	9
II	Linked lists: Introduction – Memory Allocation – Benefits – Limitations – Types: Basic Operation – Singly Linked Lists – Simple Algorithms on Linked Lists – Circular Linked Lists – Doubly Linked Lists – Circular Doubly Linked Lists – Multiply Linked Lists – Polynomial Representation – Polynomial Addition.	9
III	Stack: Introduction – ADT Stack – Implementation of Stack – Applications – Tower of Hanoi. Queues: Implementation of Queues – Basic Operations on Array, Linked Lists Based – Circular Queues .	9
IV	Binary Trees- Representation of Binary Trees- Tree Traversals.	9
V	Sorting and Graph: Types of Sorting - Representation on Graph – Operations on Graphs – BFS – DFS.	9
Total		45
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Illustrate the concept of data structures and the types of arrays.	K1, K2
2	Demonstrate the concept of ADT including list.	K1, K2
3	Enumerate and implement various data structure algorithms using stack and queues.	K1, K2, K3
4	Build the concept of Binary trees , Representation of Binary Trees and Tree Traversals.	K1, K2, K3, K4
5	Compute a good formal foundation on Types of sorting and Representation of graphs.	K1, K2, K3, K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	A.Chitra, P.T. Rajan, <i>“Data Structures”</i> , Vijay Nicole Imprints Pvt., Chennai. 2016.	
Reference Books		
1.	Ellis Horowitz, SartajShani, <i>“Data and File Structures”</i> Galgotia Publication. 1998.	

2.	Ellis Horowitz, SartajShani, Sanguthevar Rajasekaran, "Computer Algorithms" Galgotia Publication, 2008.
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Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	1	3	3
C02	3	2	1	3	1
C03	2	3	2	2	3
C04	3	1	3	3	3
C05	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	1	3	3
C02	3	2	1	3	1
C03	2	3	2	2	3
C04	3	1	3	3	1
C05	3	3	2	3	2

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Introduction	1
1.2	Algorithm Analysis	1
1.3	Problem Solving, Modular Design & Implementation of Algorithms	1
1.5	Testing, Verification	1
1.6	Arrays-Introduction, Range Of Array	1
1.7	Primitive Operations, Addressing Function	1
1.8	One Dimensional Array	1
1.9	Two Dimensional Array &Storage Representation of 2D Arrays	1
1.10	Special Types of Matrices &Multi Dimensional Array, Sparse Matrices	1
UNIT - II		
2.1	Introduction & Memory Allocation	1
2.3	Benefits ,Limitations	1
2.4	Types: Basic Operation	1
2.5	Singly Linked Lists	1

2.7	Circular Linked Lists	1
2.8	Doubly Linked Lists	1
2.9	Circular Doubly Linked Lists	1
2.10	Multiply Linked Lists	1
2.11	Polynomial Representation & Polynomial Addition.	1
UNIT - III		
3.1	Introduction	1
3.2	ADT Stack	1
3.3	Implementation of Stack	1
3.4	Applications	1
3.5	Tower of Hanoi	1
3.6	Queues	1
3.7	Implementation of Queues	1
3.8	Basic Operations on Array	1
3.9	Circular Queues	1
UNIT - IV		
4.1	Binary trees	3
4.2	Representation of Binary Trees	3
4.3	Tree Traversals	3
UNIT - V		
5.1	Types of Sorting	3
5.2	Representation on Graph	1
5.3	Operations on Graphs	1
5.4	BFS	2
5.5	DFS.	2
Total		45

Course Designer

Name: Dr. J. Thasleen Fathima

Associate Professor & Head of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTGE21	MATHEMATICAL FOUNDATIONS	Generic Elective-II	4	3	25	75	100

Course Objectives		
To enable the students to understand the basic concepts of discrete mathematics and applying its concepts to design algorithms.		
UNIT	Contents	No. of Hours
I	Matrices: Introduction – Types of matrices - Inverse of a Matrix – Rank of a Matrix– Simultaneous Linear Equation – Characteristic Equation and Cayley Hamilton Theorem.	15
II	Set theory: Introduction – Relations - Equivalence Relations – Partial Order – Functions – Binary Operations – Group: Definitions and Examples– Elementary Properties of a group.	12
III	Logic: Introduction – Connectives – Conjunction -Disjunction – Conditional and Bi-conditional statements - Truth Table – Tautology Implication -Equivalence of Formulae.	9
IV	Graph Theory: Introduction – Definition and Examples – Degrees and Sub graphs – Matrices – Eulerian Graphs – Hamiltonian Graphs.	12
V	Lattices: Introduction - Partially ordered sets – Lattices – Distributive Lattices – Modular Lattices – Boolean Algebras.	12
Total		60
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	How to Solve the problems using Cayley Hamilton Theorem and know about types of matrices.	K1, K2
2	Work with relations and illustrate functions as relations	K1,K2
3	Tabulate the truth table by analyzing prepositions and Prove it algebraically.	K1, K2
4	Compute the types of graphs and apply in its concepts to design algorithms.	K1,K2,K3,K4
5	Identify lattices as algebraic structures and simplify Boolean expressions.	K1,K2,K3,K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1.	S.Arumugam & A.Thangap and ilsaac, A. Somasundrram “Modern Algebra” . Unit I – Chapter 7.0, 7.2, 7.3, 7.5 - 7.7, Unit II – Chapter 1.0, 2.1 – 2.5, Unit V – Chapter 9.1 – 9.9	
2.	Dr.M.K.Venkaatraman, Dr.N.Sridharan, Dr.N.Chandresekaran “Discrete	

	Mathematics". UnitIII–Chapter9.1 –9.30
3.	S.A.Ramachandran " Invitation to Graph theory " Scitech Publication, 2005, Chennai. Unit-IV- Chapter2.0 -2.3,2.8,5.1–5.2
Reference Books	
1.	J. P. Tremblay and R. Manohar, " Discrete Mathematical Structures with ApplicationstoComputerScience ",TataMcGraw-HillEducationPrivateLimited, 38 th reprint 2010
2.	NarsinghDeo " Graph Theory with Applications to Engineering & Computer Science ", Dover Publications, INC.

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	2	3	3
C02	2	3	1	3	1
C03	3	2	2	2	3
C04	2	3	3	3	3
C05	3	3	2	3	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	3	1	3	1
C03	3	2	2	2	3
C04	2	3	3	3	3
C05	3	3	2	3	1

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LECTURE SCHEDULE

Module No.	Topic	No. of Lectures
UNIT - I		
1.1	Introduction	1
1.2	Types of matrices	1
1.3	Inverse of a Matrix	3
1.4	Rank of a Matrix	3
1.5	Simultaneous Linear Equation	3
1.6	Characteristic Equation and Cayley Hamilton Theorem.	4
UNIT - II		
2.1	Introduction	1
2.2	Relations	2

2.3	Equivalence Relations	1
2.4	Partial Order	1
2.5	Functions	2
2.6	Binary Operations	2
2.7	Group: Definitions and Examples	2
2.8	Elementary Properties of a group.	1
UNIT - III		
3.1	Introduction	1
3.2	Connectives	1
3.3	Conjunction	1
3.4	Disjunction	1
3.5	Conditional and Bi-conditional statements	1
3.6	Truth Table	2
3.7	Tautology Implication	1
3.8	Equivalence of Formulae.	1
UNIT - IV		
4.1	Introduction	1
4.2	Definition and Examples	2
4.3	Degrees and Sub graphs	2
4.4	Matrices	1
4.5	Eulerian Graphs	3
4.6	Hamiltonian Graphs	3
UNIT - V		
5.1	Introduction	1
5.2	Partially ordered sets	2
3.5	Lattices	2
5.4	Distributive Lattices	2
5.5	Modular Lattices	2
5.6	Boolean Algebras.	3
Total		60

Course Designer

Name: Ms. R. Neshana

Assistant Professor of Information Technology

Course Code	Course Title	Category	Hours	Credits	Marks		
					CIAE	TEE	Total
26UCTGE2P	DATA STRUCTURES LAB	Generic Elective - II	2	2	40	60	100

Course Objectives		
<ul style="list-style-type: none"> Understand and acquire basic knowledge of data structure. To apply the concepts in programming (Arrays, stack, Queue, linked List, searching and sorting concepts, Trees and graph structures) 		
UNIT	Contents	No. of Hours
I	1. Program to demonstrate the one and two dimensional Arrays 2. Program for multi-dimensional arrays. 3. Write a programs to implement list ADT to perform following operations a) Insert an element into a list. b) Delete an element from list c) Search for a key element in list d) Count number of nodes in list	10
II	1. Write C++ programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT 2. Write C++ programs to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.	12
III	1. Write a C++ programs to implement recursive and non-recursive a) Linear search b) Binary search 2. Write C++ programs for implementing the following sorting methods: a) Merge sort b) Heap sort c) Bubble sort d) Selection sort e) quick sort f) insertion sort	18
IV	1. Write C++ programs that use recursive functions to traverse the given binary tree in a) Preorder b) inorder c) postorder. 2. Write a C++ program to perform the following operations a) Insertion into an AVL-tree b) Deletion from an AVL-tree	10
V	1. Write a C++ program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree. 2. Write a C++ program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree	10
Total		60
Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Understand and Apply the concept of data structures, types of arrays and lists.	K1, K2, K3

2	Demonstrate the concept of ADT including single and Doubly linked list, Stack and Queue.	K1, K2, K3
3	Evaluate good formal foundation on various sorting and searching techniques in data structure.	K1, K2, K3, K4
4	Analyze the concept of Binary trees , Representation of Binary Trees and Tree Traversals.	K1, K2, K3, K4
5	Analyze binary search trees and, B trees and	K1, K2, K3, K4
K1-Knowledge, K2-Understand, K3-Apply, K4- Analyze		
Textbooks		
1	A.Chitra, P.T. Rajan, " Data Structures ", Vijay Nicole Imprints Pvt.,Chennai. 2016.	
Reference Books		
1.	Ellis Horowitz, SartajShani, " Data and File Structures " Galgotia Publication. 1998.	
2.	Ellis Horowitz, SartajShani, Sanguthevar Rajasekaran, " Computer Algorithms " Galgotia Publication, 2008.	

Mapping with Programme Outcomes:

CO /PO	P01	P02	P03	P04	P05
C01	3	3	3	3	2
C02	3	2	3	2	2
C03	3	2	2	1	2
C04	2	1	3	1	2
C05	3	2	3	1	1

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PS01	PS02	PS03	PS04	PS05
C01	3	2	2	3	2
C02	3	2	2	3	1
C03	3	2	2	2	1
C04	3	2	2	2	1
C05	2	1	2	2	2

Strong-3 Medium-2 Low-1

COURSE CONTENTS AND LAB SCHEDULE

Module No.	Topic	No. of Hours
UNIT - I		
1.1	Program to demonstrate the one and two dimensional Arrays	4
1.2	Program for multi-dimensional arrays.	3
1.3	Write a programs to implement list ADT to perform following operations : Insert, Delete, Search , count number	3

	of nodes in list	
UNIT - II		
2.1	Write C++ programs to implement stack ADT operation using a singly linked list.	4
2.2	Write C++ programs to implement Queue ADT operation using a singly linked list.	4
2.3	Write C++ programs to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.	4
UNIT - III		
3.1	Write a C++ programs to implement recursive and non-recursive a) Linear search b) Binary search	6
3.2	Write C++ programs for implementing the following sorting methods: Merge sort, Heap sort and Bubble sort	6
3.3	Write C++ programs for implementing the following sorting methods: Selection sort, quick sort and insertion sort	6
UNIT - IV		
4.1	Write C++ programs that use recursive functions to traverse the given binary tree in a) Preorder b) inorder c) postorder.	4
4.2	Write a C++ program to perform the following operations a) Insertion into an AVL-tree b) Deletion from an AVL-tree	6
UNIT - V		
5.1	Write a C++ program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.	5
5.2	Write a C++ program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree	5
Total		60

Course Designer

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