CAUVERY COLLEGE FOR WOMEN(AUTONOMOUS)

Nationally Accredited with 'A' Grade by NAAC

ISO 9001:2015 Certified

TIRUCHIRAPPALLI

DEPARTMENT OF INFORMATION TECHNOLOGY

SYLLABUS

2023 - 2024

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally accredited (III Cycle) with "A" Grade

ISO 9001:2015 Certified

Annamalai Nagar, Tiruchirappalli – 18

DEPARTMENT OF INFORMATION TECHNOLOGY

Vision

The Department of Information Technology envisions to create technically competent, skilled intellectual IT professionals, efficient problem solvers, innovators and entrepreneurs to meet the current challenges of the modern computing industry.

Mission

- To provide quality education and elevate the students towards higher educational programs
- To encourage and guide the students to improve their competency skills in information technology market

To equip the students to cater the industrial demands through providing advance training

UG Programme Structure (Science)

Cauvery College for Women (Autonomous)

Department of Information Technology

B.Sc Information Technology

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS – LOCF)

(For the Candidates admitted from the Academic year 2023-2024 and onwards)

Sem	Part	Course	Course Title	Course Code	Inst. Hrs.	Credits	Exam			Total
							Hr	Marks		
								Int.	Ext	
I	I	Language Course -I (LC)	பொதுத்தமிழ் - 1	23ULT1	6	3	3	25	75	100
			Hindi Ka Samanya Gyan aur Nibandh	23ULH1						
			Poetry,Grammar and History of Sanskrit Literature	23ULS1						
			Foundation Course: Paper I- French – I	23ULF1						
	II	English Language Course-I(ELC)	General English -I	23UE1	6	3	3	25	75	100
	III	Core Course – I(CC)	Programming in C	23UIT1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	C Programming (P)	23UIT1CC1P	3	3	3	40	60	100
		First Allied Course-I(AC)	Numerical Methods	23UIT1AC1	4	3	3	25	75	100
		First Allied Course-II(AC)	Graph theory and its Applications	23UIT1AC2	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	Value Education	23UGVE	2	2		100		100
	Total				**30**	**22**				**700**

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
							Hrs	Marks		
								Int.	Ext	
II	I	Language Course-II(LC)	பொதுத்தமிழ் - II	23ULT2	6	3	3	25	75	100
			Hindi Literature & Grammar – II	22ULH2						
			Prose, Grammar and History of Sanskrit literature	23ULS2						
			Basic French – II	22ULF2						
	II	English Language Course- II(ELC)	General English-II	23UE2	6	3	3	25	75	100
	III	Core Course – II (CC)	Data Structures and Algorithms	23UIT2CC2	4	4	3	25	75	100
		Core Practical - II (CP)	Data Structures using C(P)	23UIT2CC2P	2	2	3	40	60	100
		Core Course-III(CC)	Digital Fundamentals	22UIT2CC3	4	4	3	25	75	100
		First Allied Course-III(AC)	Operations Research	22UIT2AC3	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-II(AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-III(AECC)	Innovation and Entrepreneurship	22UGIE	2	1	-	100	-	100
		Extra Credit Course	SWAYAM		As per UGC Recommendation					
	Total				**30**	**22**				**800**

Semester I	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
23UIT1CC1	**PROGRAMMING IN C**	**CORE COURSE – I (CC)**	**5**	**5**

Course Objectives

- To familiarize the students with the understanding of code organization
- To improve the programming skills
- Learning the basic programming constructs.

Course Outcomes and Cognitive Level Mapping

CO Number	Course Outcome	Cognitive Level
CO1	Outline the fundamental concepts of C programming languages, and its features	K1
CO2	Demonstrate the programming methodology.	K2
CO3	Identify suitable programming constructs for problem solving.	K3
CO4	Select the appropriate data representation, control structures, functions and concepts based on the problem requirement.	K4
CO5	Evaluate the program performance by fixing the errors.	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	1	2	2	2	3	2
CO2	3	2	3	2	2	3	3	2	3	2
CO3	3	3	3	2	2	3	3	2	3	3
CO4	3	2	3	2	3	2	2	2	3	3
CO5	3	3	3	2	3	3	3	2	2	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Studying Concepts of Programming Languages**- Language Evaluation Criteria - Language design - Language Categories - Implementation Methods – Programming Environments - Overview of C: History of C- Importance of C- Basic Structure of C Programs- Executing a C Program- Constants, Variables and Data types - Operators and Expressions - Managing Input and Output Operations	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
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.Arrays - Character Arrays and Strings	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**User Defined Functions:** Elements of User Defined Functions- Definition of Functions- Return Values and their Types- Function Call- Function Declaration- Categories of Functions- Nesting of Functions-Recursion	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Structures and Unions:** Introduction- Defining a Structure- Declaring Structure Variables Accessing Structure Members- Structure Initialization- Arrays of Structures- Arrays within Structures- Unions- Size of Structures	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Pointers:** Understanding Pointers- Accessing the Address of a Variable- Declaring Pointer Variables- Initializing of Pointer Variables- Accessing a Variable through its Pointer- Chain of Pointers- Pointer Expressions- Pointer and Scale Factor- Pointer and Arrays- Pointers and Character Strings- Array of Pointers- Pointer as Function Arguments- Functions Returning Pointers- Pointers to Functions-Memory model-File Management in C	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	**Self Study for Enrichment** (Not included for End Semester Examinations) Algorithm- Flowchart- Develop algorithms for real time scenario- Simple expressions- Conversion programs- swapping numbers (with and without using temporary variable). Programs for checking eligibility-Triangle formation-Sum of series-Array manipulations (Sorting, searching, insert, delete and merging)-String handling programs- Dynamic memory management using pointers- Employee pay bill preparation, Student mark list using Files.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Textbooks

1.Robert W. Sebesta, (2012), ―Concepts of Programming Languages‖, Fourth Edition, Addison Wesley (Unit I : Chapter – 1)

1. E. Balaguruswamy, (2010), ―Programming in ANSI C‖, Fifth Edition, Tata McGraw Hill Publications.

References

1.Ashok N. Kamthane, Amit Ashok Kamthane (2015). Programming in C, 3rd Edition, Pearson India Education Services Pvt. Ltd.

2.Byron Gottfried, (2010), ―Programming with C‖, Schaums Outline Series, Tata McGraw Hill Publications

Web References

1. https://www.learn-c.org/
2. https://www.cprogramming.com/
3. https://www.tutorialspoint.com/cprogramming/index.html
4. http://www.programiz.com/c-programming
5. http://www.programmingsimplified.com/c-program-examples

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designer

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.

Semester I	Internal Mark: 40		External Mark: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
23UIT1CC1P	**C PROGRAMMING (P)**	**CORE COURSE- I (CP)**	**3**	**3**

Course Objectives

- The Course aims to provide exposure to problem-solving through C programming
- It aims to train the student to the basic concepts of the C -Programming language
- Apply different concepts of C language to solve the problem

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate the understanding of syntax and semantics of C programs.	K1
CO2	Identify the problem and solve using C programming techniques.	K2
CO3	Identify suitable programming constructs for problem solving.	K3
CO4	Analyze various concepts of C language to solve the problem in an efficient way.	K4
CO5	Develop a C program for a given problem and test for its correctness.	K5

Mapping with Programme Outcomes

COs\ POs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2	2	3	1	2	3
CO2	3	2	3	2	3	3	2	2	2	3
CO3	3	2	2	2	2	3	3	2	3	2
CO4	3	3	2	3	2	3	3	2	3	3
CO5	3	3	3	2	3	3	3	3	2	3

"1" – Slight (Low) Correlation **"2" – Moderate (Medium) Correlation**
"3" – Substantial (High) Correlation **"-" indicates there is no correlation.**

Syllabus

1. Programs using Input/ Output functions
2. Programs on conditional structures
3. Command Line Arguments
4. Programs using Arrays
5. String Manipulations
6. Programs using Functions
7. Recursive Functions
8. Programs using Pointers
9. Files
10. Programs using Structures & Unions

Text Book

1. E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books

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

Web References

1. https://www.tutorialspoint.com/cprogramming
2. https://www.javatpoint.com/c-programming-language-tutorial
3. https://www.w3schools.in/category/c-tutorial

Course Designer

Dr. M. Anandhi, Associate Professor, Department of Information Technology.

FIRST ALLIED COURSE – I

NUMERICAL METHODS

(For B.Sc Computer Science, BCA, Information Technology &
Computer Science with Cognitive Systems)

(2023 – 2024 ONWARDS)

Semester I	**Internal Marks:25**		**External Marks:75**	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
23UCG1AC1/ 23UCS1AC1/ 23UCA1AC1/23UIT1AC1	**NUMERICAL METHODS**	**ALLIED**	**4**	**3**

Course Objectives

- **Learn** the various topics in Numerical methods.
- **Understand** the fundamentals of algebraic equations, interpolation, numerical differentiation and integration.
- **Develop** skills in solving problems of numerical techniques.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Cognitive Level**
CO1	Remember the basic concepts of numerical methods.	**K1**
CO2	Illustrate the various notions of computational numerical streams.	**K2**
CO3	Apply the different techniques of numerical problems	**K3**
CO4	Classify the methods of numerical techniques.	**K4**
CO5	Examine the solutions of numerical problems.	**K4**

Mapping of CO with PO and PSO

COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	3	3	3	3	3	3	2	3
CO2	3	2	3	3	3	3	3	3	3	2
CO3	3	2	3	3	3	3	3	3	2	2
CO4	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Solution of Algebraic and Transcendental Equations**: Introduction – Bisection Method –The Iteration Method – The Method of False Position – Newton Raphson Method. (Simple Problems Only).	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
II	**Interpolation:** Finite differences – Forward differences – Backward differences – Central differences – Newton's Formulae for interpolation–Interpolation with Unevenly Spaced Points – Lagrange's Interpolation Formula. (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
III	**Numerical Differentiation and Integration:** Introduction – Numerical Differentiation – Numerical Integration – Trapezoidal Rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
IV	**Numerical Linear Algebra:** Solution of Linear Systems – Direct Methods – Gauss - Elimination – Gauss -Jordan method. Solution of Linear Systems – Iterative Methods. (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
V	**Numerical Solution of Ordinary Differential Equations:** Introduction – Solution by Taylor's Series – Euler's Method – Modified Euler's Method – Runge-Kutta Method–Predictor-Corrector Methods – Adams-Moulton Method – Milne's Method(Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
VI	**Self-Study for Enrichment (Not included for End Semester Examination)** Ramanujan's Method – Bessel's Formula – Newton-Cotes Integration Formulae –The QR Method – Picard's Method of Successive Approximations	-	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4

Text Book

Sastry.S.S (2004), *Introductory Methods of Numerical Analysis* (Third Edition), Prentice Hall of India Private Ltd, New Delhi.

Chapters and Sections

UNIT–I	Chapter 2:	Sections: 2.1 – 2.5 (Omit 2.3.1 & 2.5.1)
UNIT II	Chapter 3:	Sections: 3.3 : 3.3.1 – 3.3.3, 3.6, 3.9 : 3.9.1
UNIT-III	Chapter 5:	Sections: 5.1, 5.2 (only), 5.4 : 5.4.1 – 5.4.3
UNIT-IV	Chapter 6:	Sections: 6.3: 6.3.2, 6.4
UNIT-V	Chapter 7:	Sections: 7.1,7.2, 7.4: 7.4.2, 7.5,7.6

Reference Books

1. Venkataraman, M.K. (2003). *Numerical Methods in Science and Engineering*, The National Publishing Company.
2. Iyengar S.R.K, Jain R.K, (2009). *Numerical Methods*, New Age International Publishers.
3. Subramanian,N. (2007). *Numerical Methods*, SCM Publisher, Erode.

Web References

1. **https://tinyurl.com/4y7knvm9**
2. **https://tinyurl.com/t29njcy5**
3. **https://www.youtube.com/watch?v=TIWRyzzFUYQ**
4. **https://www.youtube.com/watch?v=iviiGB5vxLA**
5. **https://www.youtube.com/watch?v=j_4MVZ3VADU**

Pedagogy

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

FIRST ALLIED COURSE - II
GRAPH THEORY AND ITS APPLICATIONS
(2023-2024 Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSETITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
23UCS1AC2/ 23UIT1AC2	**GRAPH THEORY AND ITS APPLICATIONS**	**ALLIED**	**4**	**3**

Course Objectives

- **Introduce** the notion of graph theory and its application.
- **Understand** the fundamental concepts in graph theory.
- **Explore** some of the most important notions of graph theory and develop their skills and solving basic exercise.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Define basic definitions of graphs.	K1
CO2	Describe the concepts and Characterization of Graphs.	K2
CO3	Explain the notion of Spanning Trees.	K2
CO4	Compute the properties of Planar Graphs.	K3
CO5	Analyze the concept of graphs in Matrix Representation.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	3
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

“1” – Slight (Low) Correlation ¬ “2” – Moderate (Medium) Correlation ¬

“3” – Substantial (High) Correlation ¬ “-” indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**INTRODUCTION** Definition of a Graph – Application of Graphs – Finite and Infinite Graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex and Null Graph. **PATHS AND CIRCUITS** Isomorphism – Subgraphs – Walks, Paths and Circuits – Connected Graphs, Disconnected Graphs and Components.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**PATHS AND CIRCUITS** Euler Graphs – Operation on Graphs – More on Euler Graphs – Hamiltonian Paths and Circuits – The Traveling Salesman Problem.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**TREES AND FUNDAMENTAL CIRCUITS** Trees – Some Properties of Trees – Pendant Vertices in a Tree – Distance and Centers in a Tree – Rooted and Binary Trees – On Counting Trees – Spanning Trees.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**CUT - SETS AND CUT - VERTICES** Cut-Sets – Some Properties of a Cut-Set – All Cut-Sets in a Graph – Fundamental Circuits and Cut-Sets – Connectivity and Separability.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**PLANAR GRAPHS** Planar Graphs – Kuratowski's Two Graphs – Different Representations of a Planar Graph. **MATRIX REPRESENTATION OF GRAPHS** Incidence Matrix – Submatrices of A(G) – Circuit Matrix.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self Study for Enrichment** **(Not included for End Semester Examination)** Brief History of Graph Theory – A Puzzle with Multicolored Cubes – Finding All Spanning Trees of a Graph – Network Flows – Combinatorial Vs. Geometric Graphs – An Application to a switching network.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Book

1. Narsingh Deo, "*Graph Theory with Application to Engineering and Computer Science*" Prentice Hall of India 2010(Reprint).

Chapters and Sections

UNIT-I	Chapter 1: Sections 1.1 – 1.5
	Chapter 2: Sections 2.1, 2.2, 2.4, 2.5
UNIT-II	Chapter 2: Sections 2.6 – 2.10
UNIT-III	Chapter 3: Sections 3.1 – 3.7
UNIT- IV	Chapter 4: Sections 4.1 – 4.5
UNIT- V	Chapter 5: Sections 5.2 – 5.4
	Chapter 7: Sections 7.1 – 7.3

Reference Books

1. Arumugam S and Ravichandran S, "Invitation to Graph Theory", Scitech Publications (India) Private Limited.
2. Gary Chartrand and Ping Zhang, "Introduction to Graph Theory", Tata McGraw-Hill Edition, 2004.

Web References

1. **https://youtu.be/S1Zwhz-Mhcs**
2. **https://youtu.be/R5LZIpz-oIE**
3. **https://youtu.be/X2B_J1ajsIY**
4. **https://youtu.be/5M7bOXrn54A**
5. **https://youtu.be/QwX1ncB13B0**

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

Dr. P. SHALINI

Semester II	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
23UIT2CC2	**DATA STRUCTURES AND ALGORITHMS**	**CORE COURSE – II(CC)**	**4**	**4**

Course Objectives

- To provide the knowledge of basic data structures and their implementations.
- To understand the importance of data structures in the context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the abstract data types and basics of Algorithms	K1
CO2	Demonstrate the performance of basic linear and nonlinear data structures	K2
CO3	Implement the basic data structures and Algorithm design techniques	K3
CO4	Analyze the efficiency of Algorithms	K4
CO5	Assess, evaluate and choose appropriate data structure and algorithmic technique to solve the real-world problems	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**2**	**2**
CO2	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**1**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**

"1" – Slight (Low) Correlation **"2" – Moderate (Medium) Correlation**

"3" – Substantial (High) Correlation **"-" indicates there is no correlation.**

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction-Basic Terminology-Data Structures-Data Structures Operation-Abstract Data Types (ADT)- Algorithms: Complexity, Time-Space Tradeoff. Arrays: Representation of Arrays- Linear Arrays - Insertion – Deletion and Traversal of a Linear Array - Array as an Abstract Data Type.	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
II	Stacks: Array and Linked Representation of Stack-Prefix-Infix and Postfix Arithmetic Expressions-Conversion-Evaluation of Postfix Expressions. Queues: Definition-Linked Representation of Queue - The Queue Abstract Data Type-Circular Queues.	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
III	Linked list: Introduction- Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Searching a Linked List – Insertion into and Deletion from a Linked List. Trees: Introduction - Binary Trees – Representing Binary Trees in Memory - Binary Tree Traversals — Binary Search Tree – Searching, Inserting and Deleting in Binary Search Trees.	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
IV	Sorting and Searching: Sorting: Introduction-Insertion Sort-Selection Sort – Merge Sort - Quick Sort. Searching: Linear Search-Binary Search	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
V	Graphs: Introduction – Graph Theory Terminology – Sequential Representation of Graphs- Warshall's Algorithm – Linked Representation of Graphs – Operations on Graph - Graph Traversals.	12	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** Multi Dimensional Array-Recursion - Traversal Algorithms using Stacks Dequeue- Bubble Sort– Topological Sort.	-	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Textbook

1.Data Structures with C, Seymour Lipschutz (Schaum's Outlines), 2011, McGraw Hill Education Pvt. Ltd.,

Reference Books

1. Ellis Horowitz, Sartaj Sahni and Susan and Rewson-Freed(2008), Fundamentals of Data Structures in C,2nd Edition, Universities Press

2. ISRD Group, (2009). Data Structures Using, Tata McGraw Hill Education Pvt. Ltd, New Delhi.

Web References

1. https://www.geeksforgeeks.org/data-structures
2. https://www.tutorialspoint.com/data_structures_algorithms/index.html
3. https: ://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designer

1. Dr. A. Bhuvaneswari, Associate Professor, Department of Information Technology.
2. Dr. P. TamilSelvi, Associate Professor, Department of Information Technology

Semester II	Internal Mark: 40		External Mark: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
23UIT2CC2P	**DATA STRUCTURES USING C (P)**	**CORE PRACTICAL – II (CP)**	**2**	**2**

Objectives:

- To develop and execute C programs for various data structures
- To apply the knowledge of programming features
- To Implement various Algorithms

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
CO1	Recall program execution and debugging	**K1**
CO2	Demonstrate the ideas of Data structures	**K2**
CO3	Make use of Operations of Linear and Non- linear data structures	**K3**
CO4	Develops the ability to analyze a problem and implement an algorithm to solve it.	**K4**
CO5	Acquire logical thinking, Identify the correct and efficient ways of solving problems	**K5**

Mapping with Programme Outcomes

COs\POs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**2**	**2**
CO2	**3**	**2**	**3**	**1**	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Syllabus

1. Stack implementation
2. Operations on Queue
3. Linked List
4. Binary Tree Traversal
5. Operations of Graph
6. Sorting
7. Searching

Course Designer

1. Dr. A. Bhuvaneswari, Associate Professor, Department of Information Technology.
2. Dr. P. Tamil Selvi, Associate Professor, Department of Information Technology.

Semester II	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UIT2CC3	**DIGITAL FUNDAMENTALS**	**CORE COURSE – III (CC)**	**4**	**4**

COURSE OBJECTIVES

- To provide knowledge on various number systems
- To inculcate the concepts of Boolean algebra
- To make the students learn combinational circuits
- To make the students learn combinational circuits

COURSE OUTCOMES

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of digital logic	**K1**
CO2	Apply the conversion of number system	**K3**
CO3	Apply the Boolean algebra to generate digital circuits	**K3**
CO4	Design combinational circuits using gates	**K5**
CO5	Construct sequential circuits using registers	**K4**

Mapping with Programme Specific Outcomes and Programme Outcomes

COs\ PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**

"1" – Slight (Low) Correlation **"2" – Moderate (Medium) Correlation**

"3" – Substantial (High) Correlation **"-" indicates there is no correlation.**

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**NUMBER SYSTEMS AND CODES:** Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Binary Addition and Subtraction – Binary subtraction by 1's and 2's complement – 9's and 10's complement Binary Multiplication and Division – Octal Numbers – Hexadecimal Numbers – Binary Codes – 8421 code - Error Detecting and Correcting Codes.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**BOOLEAN ALGEBRA AND LOGIC GATES:** Boolean Algebra – Laws and Theorems – Minterms and Maxterms — DeMorgan's Theorems. Logic Gates: AND, OR, NOT, NAND,NOR and Exclusive OR Gates – Exclusive NOR Gate –Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB- Simplifying logic circuits- Sum of products and products of sum form	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**K MAP TECHNIQUES:** Simplification of Boolean expression using Karnaugh Map with 2, 3 and 4 variables -Sum of Products - Product of Sum -– Don't Care Conditions – Overlapping Groups – Rolling the Map – Eliminating Redundant Group	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**COMBINATIONAL LOGIC CIRCUITS:** Half and Full Adders – BCD Adder - Half and Full Subtractors – Multiplexers (4:1 line) – 1 to 4 line Demultiplexers – Decoders, Encoders	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**SEQUENTIAL LOGIC CIRCUITS:** Flip Flops – RS Flip Flop – Clocked RS Flip Flop – D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop – Clock – Counters and Shift Registers: Counters – Asynchronous or Ripple Counter – Ring Counter. Shift Registers.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **Gray Code – Excess – 3 Code** NAND and NOR Implementation — AND-OR-INVERT Implementation – OR-AND-INVERT Implementation - SISO – SIPO – PIPO – PISO	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

Digital Logic and Computer Design. (2017). M. Morris Mano, India: Pearson India.

Reference Books

1. Principles of Digital Electronics, Dr. K. Meena, PHI Learning Private Limited, New Delhi, 2009.
2. Malvino and Leach –Digital Principles and Application, 2014

Web References

1. https://archive.org/details/digitalcomputerf00bart 9.
2. https://www.pdfdrive.com/digital-computer-fundamentals-computerarchitecture-e5719965.html
3. https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science-spring-2015/resources/digital-logic/

Course Designer

Dr. P. Tamilselvi, Associate Professor, Department of Information Technology

Semester II	Internal Marks : 25		External Marks : 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCS2AC3/ 22UCG2AC3/ 22UCA2AC3/ 22UIT2AC3/	**OPERATIONS RESEARCH**	**ALLIED III**	**4**	**3**

Course Objectives

- **Understand** the various features of Operations research.
- **Analyze** the optimum solutions using Operations research.
- **Explore** the concepts of Operations research in real life problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Define the various techniques of Operations research.	**K1**
CO2	Illustrate the various notions in the respective streams.	**K2**
CO3	Identify the different terminologies of Operations research	**K3**
CO4	Analyze the solutions of mathematical problem using specific techniques.	**K4**
CO5	Simplify the optimum solutions of a mathematical problem.	**K4**

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	2	3	3	3	2	3
CO2	3	2	3	3	2	3	3	3	3	2
CO3	3	2	3	3	2	3	2	3	2	2
CO4	3	2	2	2	2	3	3	2	3	2
CO5	3	2	3	2	2	3	3	3	2	2

"1" – Slight (Low) Correlation **"2" – Moderate (Medium) Correlation –¬**

"3" – Substantial (High) Correlation **"-" indicates there is no correlation.**

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Operations Research** Introduction-Origin and Development of O.R.- Nature and Features of O.R.- Scientific Method in O.R.- Modelling in Operations Research - Advantage and Limitation of Models- General Solution Methods for O.R. Models- Methodology of Operations Research- Operations Research and Decision Making **Linear Programming Problem- Mathematical Formulation** Introduction-Linear programming Problem- Mathematical Formulation of the problem -Illustrations on Mathematical Formulation of LPPs.(simple problems only) **Linear programming problem-graphical Solution and Extension** Introduction- Graphical Solution Method- General Linear Programming Problem- Canonical and Standard Forms of LPP.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Linear Programming Problem-Simplex Method** Introduction-Fundamental Properties of Solutions- The computational Procedure- The Simplex Algorithm-Use of Artificial Variables-Big M method.(simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Transportation problem** Introduction-LP Formulation of the Transportation Problem- Existence of Solution in T.P-TheTransportation Table-Loops in Transportation Table-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality-Economic interpretation of u_j's and v_j's - Degeneracy in Transportation Problem-Transportation Algorithm (MODI method), (simple problems only). **Assignment Problem** Introduction-Mathematical Formulation of the Problem- Solution Methods of Assignment Problem- Special Cases in Assignment Problems(simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

IV	**Sequencing problem** Introduction-Problem of Sequencing-Basic Terms Used in Sequencing- Processing *n* Jobs through Two Machines- Processing *n* Jobs through *k* Machines(problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Network Scheduling by PERT/CPM** Introduction- Network: Basic Components- Logical Sequencing- Rules of Network Construction- Concurrent Activities - Critical Path Analysis -Probability Considerations in PERT.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self-Study for Enrichment** **(Not included for End Semester Examination)** Application of Operations Research. – Two-Phase method – The Travelling Salesman problem – Processing 2 Jobs through *k* Machines –. Inventory Models(without shortage)	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Kanti Swarup, P.K. Gupta, Manmohan.(2019). *Operations research, Sultan Chand Publications*.

Chapters and Sections

UNIT–I Chapter 1: Sections 1:1 – 1:9

Chapter 2: Sections 2:1 – 2:4

Chapter 3: Sections 3:1 – 3:5

UNIT II Chapter 4: Sections 4:1 – 4:4

UNIT-III Chapter 10: Sections 10:1 – 10:3, 10:5, 10:6, 10:8 – 10:13

Chapter 11: Sections 11:1 – 11:4

UNIT-IV Chapter 12: Sections 12:1 – 12:5

UNIT-V Chapter 25: Sections 25:1 – 25:7

Reference Books

4. Hamdy A.Taha (2017),*Operations Research An Introduction*, Pearson India Education services PVT Ltd.
5. Premkumar Gupta, Hira D.S.(2004), *Operations Research*, S.Chand & Company Ltd, New Delhi.
6. Chandrasekhara Rao.K,Shanti Lata Mishra(2008), *Operations Research*, Narosa Publishing House PVT Ltd, New Delhi.

Web References

6. **https://www.britannica.com/topic/operations-research**
7. **https://byjus.com/maths/linear-programming/**
8. **https://www.gatexplore.com/transportation-problem-study-notes/**
9. **https://youtu.be/rowWM-MijXU**
10. **https://youtu.be/TQvxWaQnrqI**
11. **https://youtu.be/RTX-ik_8i-k**
12. **https://youtu.be/s5KZw1EpBEo**

Pedagogy

Power point presentation, Group discussion, Seminar, Assignment.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala