CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

NATIONALLY ACCREDITED WITH ' A^+ ' GRADE BY NAAC

TIRUCHIRAPPALLI

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M. Sc. COMPUTER SCIENCE

SYLLABUS

2025-2026 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

VISION

To create an ambience for a quality academic erudition which drives technologically adept, innovative and globally competent graduates with ethical values

MISSION

- To have a breath of knowledge across the subject areas of Computer Science
- To professionally enrich the students for successful career in Academic, Industry and Research
- To promote and inculcate ethics and code of professional practice among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR M.Sc. COMPUTER SCIENCE PROGRAMME

PO NO.	Programme Outcome On completion of M.Sc. Computer Science The students will be able to
PO 1	**DOMAIN KNOWLEDGE** Acquire the in-depth computing knowledge both conceptual and applied pertaining to the core discipline
PO 2	**PROBLEM SOLVING** Procure knowledge-based skills to satisfy the needs of society and the industry by providing hands on experience of various technologies in Computer Science
PO 3	**INNOVATION AND CRITICAL THINKING** Critically evaluate global issues, recognize the need and identify sustainable solutions through research capabilities towards Nation building initiatives
PO 4	**LIFE LONG LEARNING** Capable of upgrading and advancing knowledge through innovation and technology as evidenced by current developments
PO 5	**LEADERSHIP AND TEAMWORK** Work in collaborative environment through applications of scientific reasoning and communicate effectively to the stakeholders

PROGRAMME SPECIFIC OUTCOMES FOR M.Sc COMPUTER SCIENCE PROGRAMME

PSO NO.	Programme Specific Outcomes Students of M.Sc. Computer Science will be able to	PO s Addressed
PSO 1	Identify, formulate and develop solutions for computational challenges	PO 1 PO 2
PSO 2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in related domains	PO 1 PO 2
PSO 3	Integrate computing knowledge on crafting innovative solutions and to provide a gateway for research.	PO 2 PO 3 PO 4
PSO 4	Develop analytical and technical skills to enhance employment potential and entrepreneurship	PO 3 PO 4 PO 5
PSO 5	Imbibe professional and ethical skills to become a competent citizen for the betterment of society	PO 3 PO 4 PO 5

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PG & Research Department of Computer Science

M.Sc. Computer Science

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS- LOCF)

(For the Candidates admitted from the Academic year 2025-2026 and onwards)

Semester I

Semester	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
						Hrs.	Marks		
							Int.	Ext.	
I	Core Course– I (CC)	Analysis & Design of Algorithms	23PCS1CC1	6	5	3	25	75	100
	Core Course – II (CC)	Object Oriented Analysis and Design & C++	23PCS1CC2	6	5	3	25	75	100
	Core Course –III (CC)	Mathematical and Logical Computing	24PCS1CC3	6	5	3	25	75	100
	Core Practical - I (CP)	Algorithm and OOPS (P)	23PCS1CC1P	6	5	3	40	60	100
	Discipline Specific Elective Course-I (DSE)	A. Advanced Software Engineering	23PCS1DSE1A	6	3	3	25	75	100
		B. Advanced Computer Architecture	23PCS1DSE1B						
		C. Advanced Database Systems	23PCS1DSE1C						
	Total			**30**	**23**	-	-	-	**500**
15 Days INTERNSHIP during Semester Holidays									

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1CC1	ANALYSIS & DESIGN OF ALGORITHMS	CORE	6	5

Course Objective

- To learn the Elementary Data Structures and algorithms
- To understand the basics of an algorithm, their analysis and design
- To inculcate the knowledge of Basic Traversal and Search Techniques, Greedy method, Divide and Conquer method, Dynamic programming and Backtracking

Prerequisite

Basic concepts of data structures and algorithms

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Get knowledge about algorithms and determine their time complexity	K1
CO2	Demonstrate specific search and sort algorithms using divide and conquer technique	K2
CO3	Apply different methods to analyze the algorithm performance	K3
CO4	Compare the concept of various algorithm technique	K4
CO5	Explore the algorithm technique on Real time applications	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2	3	3	1	3	2
CO2	3	3	3	2	3	3	3	2	3	3
CO3	3	2	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	2	1	2
CO5	3	3	3	3	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:** - Algorithm Definition and Specification – Space complexity – Time Complexity –Asymptotic Notation. **Elementary Data Structures:** Stacks and Queues – Binary Trees - Binary Search Trees - Heaps – Heap sort - Graphs.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Basic Traversal And Search Techniques:** Techniques for Binary Trees – Techniques for Graphs. **Divide and Conquer:** General Method – Binary Search – Merge Sort– Quick Sort.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**The Greedy Method**: General Method – Knapsack Problem – Minimum Cost Spanning Trees: Prim's Algorithm – Kruskal Algorithm – Optimal storage on Tapes – Single Source Shortest Paths.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Dynamic Programming:** General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsack – Traveling Sales person Problem –Flow Shop Scheduling.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Back tracking**: General Method – 8-Queens Problem – Sum of Subsets – Graph Coloring– Hamiltonian Cycles. **Branch And Bound:**-The Method–Traveling Sales person.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** NP Hard and NP Complete Problems: Basic Concept – COOK's theorem – NP Hard Graph Problems – NP Hard Code Generation.		CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekan.(2017). *Fundamentals of Computer Algorithms.* 2nd Edition, University Press.

Reference Books

1. Alfred V. Aho, John E Hopcraft, Jefffrey D. Ullman.(2004). *Data Structures and Algorithms*. Pearson Education.
2. Goodrich. *Data Structures & Algorithms in Java.* 3rd Edition, Wiley.
3. Skiena.(2008).*The Algorithm Design Manual*. 2nd Edition,Springer.
4. Anany Levith.(2003). *Introduction to the Design and Analysis of algorithm.* Pearson Education Asia.
5. Robert Sedgewick, Phillipe Flajolet.(1996).*An Introduction to the Analysis of Algorithms.* Addison-Wesley Publishing Company.

Web References

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3. https://www.javatpoint.com/daa-tutorial

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar.

Course Designer

Ms.P.Muthulakshmi

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1CC2	OBJECT ORIENTED ANALYSIS AND DESIGN &C++	CORE	6	5

Course Objective

- To Present the object model, classes and objects, object orientation, machine view and model management view
- To learn the basic functions, principles and concepts of object oriented analysis and design
- To understand C++ language with respect to Object Oriented Analysis and Design

Prerequisites

Basics of Programming and Object Oriented Programming Concepts

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand the concept of Object Oriented development and modeling techniques	K1, K2
CO2	Gain knowledge about the various steps performed during object design	K2, K3
CO3	Abstract object-based views for generic software systems	K3
CO4	Link OOAD with C++ language	K4,K5
CO5	Apply the basic concepts of OOPs and familiarize to write C++ program	K5, K6

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	3	3	2
CO2	3	2	3	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	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	**The Object Model**: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. **Classes and Objects**: The Nature of an Object – Relationships among Objects- The Nature of Class – Relationship among Classes – The Interplay of Classes and Objects.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	Introduction to C++-Input and Output in C++- C++ Declarations - Control Structures.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	Functions in C++ - Classes and Objects in C++– Constructors and Destructors–Operator Overloading and Type Conversion.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	Inheritance – Pointers and Arrays-C++ And Memory: the new and Delete operators – Polymorphism and Virtual Functions.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	Applications with Files–Exception Handling – Working with Strings - Overview of Standard Template Library (STL).	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self-StudyforEnrichment:** **(Not included for End Semester Examinations)** **Classification:** The Importance of Proper Classification –Identifying Classes and Objects – Key Abstractions and Mechanisms. **Notation:** The Unified Modeling Language – Component Diagrams-Deployment Diagrams-Use Case Diagrams-Activity Diagrams-Class Diagrams-Object Diagrams.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, BobbiJ.Young, Jim Conallen, Kelli A.Houston.(2014).*Object Oriented Analysis and Design with Applications*.3rdEdition, Pearson Education.**(Unit: I)**
2. Ashok N.Kamthane.(2009),*Object-Oriented Programming with ANSI & TurboC++,7th Impression*, Pearson Education Limited.**(Unit:II - V)**

Reference Books

1. Balagurusamy (2003), *Object Oriented Programming with C++*, Second Edition, TMH.
2. Yashwant Kanetkar .(2019). *Let Us C++* , Third Edition, BPB.

Web References

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm

Pedagogy

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

Course Designer

Ms. K. Pradeepa

Semester I	Internal Marks: 25		ExternalMarks:75	
COURSE CODE	COURSETITLE	CATEGORY	HOURS / WEEK	CREDITS
24PCS1CC3	MATHEMATICAL AND LOGICAL COMPUTING	CORE	6	5

Course Objective

- **Explore** the basic concepts of Discrete Mathematics, Graph Theory.
- **Acquire** the knowledge of Fundamentals in combinatorics.
- **Analyze** the method of logical reasoning to solve variety of problems.

Prerequisite

Basic Knowledge in Relations,Functions and Graph Theory.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the various concepts in Relations, Combinatorics and Graphs.	K1
CO2	Understand the different terminologies of functions, Predicate Calculus, Recurrence Relations and Graphs and Fuzzy sets.	K2
CO3	Analyze the problems in different aspects and give solutions in their respective streams.	K3
CO4	Examine some methodologies for the related area in an effective manner.	K4
CO5	Apply the notions to distinct problems and get solutions in a easy way.	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	2	3	2	2	2	3
CO2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	3	2	2	3	2	2	3	3
CO4	3	2	2	2	2	2	2	2	2	2
CO5	2	2	2	3	3	2	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	**Relations:**- Binary Relations-Operations on Relations- Properties of Binary Relations in a Set–Equivalence Relations and Partial Orderings— Representation of a Relation by a Matrix Representation of a Relation by a Digraph. **Functions:**-More on Functions- Some Important Functions.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Foundations:**Logic– **Predicate Calculus:**Well Formed formulas Truth Table of Well Formed Formula –Tautology, Contradiction and Contingency-Equivalence of Formulas-Algebra of Propositions- Normal Forms of Well -Formed Formulas-Rules of Inference for Propositional Calculus**.**	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Combinatorics:**- Permutations-Combinations-Permutations with Repetitions- Combinations with Repetitions -Permutations of sets with indistinguishable objects.**Recurrence Relations:**Formulation as Recurrence Relations-Solving Recurrence Relation by Iteration Solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Graphs** -Connected Graphs –Examples of Special Graphs-Euler Graphs-Hamiltonian Circuits and Paths.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**From Classical(Crisp) Sets to Fuzzy Sets:**Fuzzy sets: Basic types – Fuzzy sets: Basic Concepts. **Fuzzy Sets Versus Crisp Sets:**Additional Properties of α – cuts.**Operations on Fuzzy Sets:** Types of Operations– Fuzzy Complement.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Hashing Functions-Functionally Complete Sets- Solving Linear Non homogeneous Recurrence Relations-**Crisp sets:** An Overview	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Chandrasekaran. N, and Umaparvathi. M(2015), *Discrete Mathematics,* PHI Learning Private Limited,NewDelhi.
2. George. J. Klir and Bo Yuan(2013), *Fuzzy Sets And Fuzzy Logic,* Prentice Hall ofIndia,NewDelhi.

Chapters and Sections

UNIT-I Chapter 5: Sections 5.1- 5.5, 5.8, 5.9[1]
UNIT-II Chapter 1: Section1.1[1]Chapter 2:Sections2.1-2.5, 2.7, 2.8[1]
UNIT-IIIChapter 3: Sections3.1-3.5[1]Chapter 6: Sections6.1-6.4[1]
UNIT- IV Chapter 10: Sections 10.1-10.4[1]
UNIT- V Chapter 1: Sections 1.3, 1.4 [2]Chapter 2: Sections 2.1 [2]
Chapter 3: Sections 3.1, 3.2 [2]

Reference Books

1. Tremblay,J.P.&Manohar, R. (1997). *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw- HillPublishing CompanyLimited,NewDelhi.
2. Ralph,P.Grimaldi.(2002).*Discrete and Combinatorial Mathematics,* Pearson AsiaEducation.
3. NarsinghDeo.(1997). *Graph Theory With Applications To Engineering & Computer Science.*PrenticeHallofIndia,NewDelhi.
4. Ganesh, G.J.M. (2006). *Introduction To Fuzzy Sets And Logic*, Prentice-HallofIndia,NewDelhi.

Web References

1. https://www.youtube.com/results?search_query=negation+of+the+statement
2. https://www.youtube.com/results?search_query=permutation
3. https://www.youtube.com/results?search_query=graph+theory+definitions+and+examples
4. https://www.youtube.com/results?search_query=trees+in+graph+theory
5. https://discrete.openmathbooks.org/pdfs/dmoi-tablet.pdf
6. https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar.

Course Designer

Dr. S. Saridha

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1CC1P	ALGORITHM AND OOPS (P)	CORE	6	5

Course Objective

- To learn the applications of the data structures using various techniques
- To understand C++ language with respect to Object Oriented Analysis and Design (OOAD) concepts
- T build application of OOPS concepts

Prerequisites

Basic understanding of C++ Programming

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Identify and apply the suitable data structure for the given real world problem	K2, K3
CO2	Able to understand and implement OOPS concepts.	K2,K3
CO3	Apply the concepts of Stack, Queue, Tree, List using C++	K3
CO4	Analyze the concepts of sorting and searching algorithms using relevant data structures.	K4
CO5	Interpret and Solve problem involving graphs, trees and heaps	K6

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	3	3	2
CO2	3	2	3	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

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

Exercises

1. Write a program to solve the Tower of Hanoi using recursion.
2. Write a program to traverse through Binary Search Tree using traversals.
3. Write a program to perform various operations on Stack using Linked list.
4. Write a program to perform various operations in a circular queue.
5. Write a program to sort an array of elements using Quick sort.
6. Write a program to solve the number of elements in ascending order using Heap sort.
7. Write a program to solve the knapsack problem using Greedy method
8. Write a program to search an element in a tree using Divide & Conquer strategy.
9. Write a program to place the 8 queens on an 8 x 8 matrix so that no two queens Attack.
10. Write a C++ program to perform Virtual Function
11. Write a C++ program to perform Parameterized Constructor
12. Write a C++ program to perform Friend Function
13. Write a C++ program to perform Function Overloading
14. Write a C++ program to perform Single Inheritance
15. Write a C++ program to perform Employee Details using files.

Web References

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm
3. https://www.geeksforgeeks.org/c-plus-plus/?ref=shm
4. https://www.tutorialspoint.com/cplusplus-program-to-implement-stack-using-linked-list
5. https://webeduclick.com/cpp-program-tower-of-hanoi-using-recursion/

Pedagogy

Power Point Presentation, Live Demonstration

Course Designer

Ms. S.Saranya

Semester: I	Internal Marks:25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1DSE1A	ADVANCED SOFTWARE ENGINEERING	DISCIPLINE SPECIFIC ELECTIVE	6	3

Course Objective

- To learn the concepts of Software Engineering
- To provide the idea of decomposing the given problem into Analysis, Design, Testing and Maintenance phases
- To inculcate knowledge on Software Project Management, Software Design &Testing

Prerequisites

Basics of Software Engineering &Software Project Management

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand about Software Engineering process	K1, K2
CO2	Make use of Software Project Management Skills, Design and Quality Management	K3
CO3	Analyze on Software Requirements and Specification	K4
CO4	Analyze and Compare Software Testing, Maintenance and Software Re-Engineering	K4, K5
CO5	Design and conduct various types and levels of software quality or a software project	K5, K6

Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	2	2	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	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:** The Problem Domain – Software Engineering Challenges - Software Engineering Approach. **Software Processes:** Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Requirements Analysis and Specification**: Requirements Gathering and Analysis- Software Requirements Specification (SRS) - Formal System Specification – Axiomatic Specification – Algebraic Specification. **Software Quality Management:** Software Quality-Software Quality Management System-ISO 9000 - SEI Capability Maturity Model.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Software Project Management:** Responsibilities of a Software Project Manager – Project Planning – Metrics for Project Size Estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead's Software Science – Staffing Level Estimation – Scheduling– Organization and Team Structures – Staffing – Risk Management – Software Configuration Management.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Software Design:** Outcome of the Design Process – Characteristics of a good software design – Cohesion and Coupling -Layered Arrangement of Modules- Function Oriented Design – Object Oriented Design. **Function Oriented SoftwareDesign**: Structured Analysis-Structured Design-Detailed Design-Design Review.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**Software Testing:** Basic concepts and Terminologies – Design Test Cases: Functional testing– Structural testing – Levels of testing: Unit testing, Integration Testing and System Testing – Debugging–Program Analysis tools-Some General Issues Associated with Testing: Regression testing. **Software Maintenance:** Characteristics of Software Maintenance – Software Reverse Engineering – Software Maintenance Process Models: Software Re-engineering.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self-Study for Enrichment:** (Not included for End SemesterExaminations) Requirement engineering -Strategy of Design-IEEE Recommended Practice for Software Design Descriptions - Reliability Estimation. Case Study: Student Result Management System.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Pankaj Jalote, (2005). *An Integrated Approach to Software Engineering*, 3rd Edition, Springer Science + Business Media. (**Unit: I**)
2. Rajib Mall,(2018).*Fundamentals of Software Engineering*,5thEdition, PHI Learning Private Limited. (**Unit: II - V**)

Reference Books

1. K.K.Aggarwal and Yogesh Singh,(2005). *Software Engineering*. Revised 2nd Edition, New Age International Publishers.
2. R.S.Pressman(2010).*A Practitioner's Approach-Software Engineering*. McGraw-Hill Higher Education.
3. Carlo Ghezzi.M, Jazayeri, D.Mandrioli (2010).*Fundamentals of Software Engineering*, PHI Publication

Web References

1. https://www.javatpoint.com/software-engineering-tutorial
2. https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
3. https://onlinecourses.nptel.ac.in/noc19_cs69/preview
4. https://www.google.co.in/books/edition/FUNDAMENTALS_OF_SOFTWARE_ENGINEERING_FIF/-
5. https://www.google.co.in/books/edition/_/pJc3xKQfD-MC?hl=en&gbpv=1

Pedagogy

Chalk & Talk, PPT, Group Discussion, Seminar and Assignment

Course Designer

Dr.K.Reka

Semester: I	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1DSE1B	ADVANCED COMPUTER ARCHITECTURE	DISCIPLINE SPECIFIC ELECTIVE	6	3

Course Objective

- To understand the micro-architectural design of processors
- To learn about the various techniques used to obtain performance improvement and power savings in current processors
- To gain knowledge in distributed and Parallel Computing Architecture

Prerequisites

Basic Knowledge about Microprocessor

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Remember and Understand the computer architecture	K1, K2
CO 2	Interpret and Experiment with different pipelined processor	K2, K3, K5
CO 3	Organize and Analyze the architectural features of advanced processors	K3, K4
CO 4	Examine and Evaluate the cache and memory related issues in multiprocessors	K4, K5
CO 5	Assess the historical and current developments in computer architecture and adopt to the needs	K5, K6

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	3	3	3	3	3	3	3
CO 2	3	2	3	2	3	2	3	2	2	3
CO 3	2	3	2	3	2	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	2	2
CO 5	2	3	3	3	2	2	3	3	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	**Fundamentals of Quantitative Design and Analysis:** Classes of Computers - Defining Computer Architecture-Trends in Technology, Power, Energy and Cost – Dependability- Measuring, Reporting, and summarizing Performance - Quantitative Principles of Computer Design	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Instruction-Level Parallelism:** Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Reducing Branch Costs with Advanced Branch Prediction - Overcoming Data Hazards with Dynamic Scheduling-Hardware-Based Speculation - Exploiting ILP Using Dynamic Scheduling, Multiple Issue, and Speculation	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Data-Level Parallelism in Vector SIMD and GPU Architectures:** Vector Architecture - SIMD Instruction Set Extensions for Multimedia -Graphics Processing Units- Detecting and Enhancing Loop-Level Parallelism	19	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Thread-Level Parallelism:** Centralized Shared-Memory Architectures-Performance of Symmetric Shared-Memory multiprocessor-Distributed Shared-Memory and Directory-Based Coherence-Synchronization-Models of Memory Consistency	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**Warehouse-scale Computers to Exploit Request Level and Data-Level Parallelism:**Programming Models and Workloads for Warehouse- Computer Architecture of Warehouse-Scale Computers – The Efficiency and cost of Warehouse-Scale Computers	17	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Historical Perspectives Quantitative Design and Analysis:** Limitations of Instruction-Level Parallelism and Its Exploitation-Fallacies and pitfalls of Data-Level Parallelism in Vector-Cross Cutting Issues in Thread - Level Parallelism-Using Energy Efficiency inside the server.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Book

1. John L Hennessey, David A Patterson (2019).*Computer Architecture A Quantitative Approach.* Sixth Edition, Morgan Kaufmann Elsevier.

Reference Books

1. KaiHwang, FayeBrigg(2000). *Computer Architecture And Parallel Processing*. International Edition, McGraw-Hill.
2. SimaD, FountainT, KacsukP(2000). *Advanced Computer Architectures: A Design Space Approach*.Addison Wesley.

Web References

1. www.cs.iiie.edu.in/
2. https://passlab.githlub.io/CSE565/note

Pedagogy

Chalk and talk & Seminar

Course Designer

Ms. A. Jabeen

Semester: I	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
23PCS1DSE1C	**ADVANCED DATABASE SYSTEMS**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To inculcate knowledge in Transaction Management with ACID properties
- To learn about advanced concepts of Database Management System
- To gain Knowledge in Information retrieval using XML and Internet Databases

Prerequisites

Basic knowledge about Relational Database Management Systems.

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Remember and Understand the concepts of databases	**K1, K2**
CO2	Demonstrate and make use of different kinds of databases	**K2, K3**
CO3	Identify and analyze databases for real life applications	**K3, K4**
CO4	Compare and evaluate the performance of databases based on its transaction and concurrency control feature	**K4, K5**
CO5	Interpret and develop parallel, distributed, object oriented And advanced databases for handling real time data	**K5, K6**

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	3	3	3
CO2	3	2	3	2	3	3	3	2	2	3
CO3	2	3	2	3	2	3	3	3	3	3
CO4	3	3	3	2	3	2	3	3	2	2
CO5	2	3	3	3	2	3	3	3	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	**Transactions Management:** Transaction Concepts – A Simple Transaction Model - Transaction Atomicity and Durability – Transaction Isolation- Serializability Transaction Isolation and Atomicity. **Concurrency Control:** Lock based Protocols – Deadlock Handling – Multiple Granularity – Timestamp - Based Protocols – Validation - Based Protocols.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Parallel Databases:** I/O Parallelism – Interquery Parallelism - Intraquery Parallelism - Intraoperation Parallelism-Interoperation Parallelism- Query Optimization - Design of Parallel Systems - Parallelism on Multicore Processors	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Distributed Databases:** Homogeneous and Heterogeneous Databases – Distributed Data Storage - Distributed Transactions - Commit Protocol – Concurrency Control in Distributed Databases- Availability - Distributed Query Processing- Heterogeneous Distributed Databases-Cloud Based Databases - Directory Systems	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Object Based Databases:** Complex Data Types – Structured types and Inheritance in SQL – Table Inheritance - Array and Multiset Types in SQL – ObjectIdentity and Reference Types in SQL - Implementing O-R features–Object Relational Mapping - Object-Oriented versus Object-Relational.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**XML: Extensible Markup Language:** Structured, Semi Structured and Unstructured Data – XML Hierarchical (Tree) Data Model – XML Documents, DTD, XML Schema - Storing and Extracting XML documents fromDatabases–XMLLanguages - Extracting XML documents from RelationalDatabases.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Case Studies:**SQL - MYSQL - Oracle - PostgreSQL- NOSQL -DynamoDB- MongoDB .	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Abraham Silberschatz., Henry F. Korth. S. Sudarshan (2013). *Database System Concepts*.6thEdition, McGraw Hill.**(Unit I - IV)**
2. Ramez Elmasri, Shamkant. B. Navathe (2015). *Fundamentals of Database Systems.* 6th Edition, Pearson Education.**(Unit V)**

Reference Books

1. Thomas Connolly, Carolyn Begg. (2015). *Database Systems, A Practical Approach to Design, Implementation and Management*. 6thEdition, Pearson Education.
2. Raghu Ramakrishnan, Johannes Gehrke. (2007). *Database Management System*. 3rd Edition, McGraw Hill Higher Education.

Web References

1. https://www.exploredatabase.com/p/advanced-database-concepts
2. https://www.wideskills.com/introduction-to-database

Pedagogy

Chalk and talk, Lecture, Discussion, Quiz, Demonstration, and PPT

Course Designer

Ms.R. Sridevi