E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

MASTER OF COMPUTER APPLICATIONS

Full Time Curriculum and Syllabus

First Year – First Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701CA101	Mathematical Foundations of Computer Applications	2	2	0	3	40	60	100
1702CA102	Problem Solving and C Programming	3	0	0	3	40	60	100
1702CA103	Database Management Systems	3	0	0	3	40	60	100
1702CA104	Data Structures	2	2	0	3	40	60	100
1702CA105	Computer Organization and Design	3	0	0	3	40	60	100
Laboratory Course								
1702CA106	Data structures and Programming Laboratory	0	0	4	2	50	50	100
1702CA107	Database Management Systems Laboratory	0	0	4	2	50	50	100
1704CA108	Life Skill I - Business English	0	0	2	1	100	-	100

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1701CA101	MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

- To introduce Matrix algebra, Mathematical logic, Lattices, Linear Algebra and Finite state machine automata and grammar as Mathematical Foundation of computer Applications so as to understand algorithms, computability and other theoretical aspects of Computer Applications

UNIT I MATRIX ALGEBRA **12 Hours**

Types of matrices- Rank of the Matrix- Simultaneous Linear Equation – Characteristic Equation and Cayley Hamilton Theorem – Finding Inverse – Eigen Value and Eigen Vector.

UNIT II LOGIC **12 Hours**

Statements - Connectives - Truth Tables - Normal Forms - Predicate Calculus – Inference - Theory for Statement Calculus.

UNIT III LATTICES **12 Hours**

Partial order relation – Posets - Hasse diagram - Lattices - Special Lattices - Boolean Algebra.

UNIT IV LINEAR ALGEBRA **12 Hours**

Vector spaces – Definition and examples – subspaces – Span of a set – Linear Independence – Basis and Dimension – Rank and Nullity – Matrix of Linear Transformation

UNIT V FINITE STATE MACHINE AUTOMATA AND GRAMMARS **12 Hours**

Finite state automata - Deterministic and non-deterministic model - languages accepted by Finite State Automata - Regular expressions - Context-free grammars - Derivation trees.

TOTAL: 60 HOURS

FURTHER READING:

1. Set Theory.
2. Formal Languages.

COURSE OUTCOMES:

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

CO1: Apply mathematical logic and develop analytical solutions for logical problems

CO2: Comprehend the algebraic structure with their applications to handle algebraic spaces

CO3: Abstract generalizations and computability

REFERENCES:

1. Trembley.J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Publishing Company Limited, New Delhi. Reprinted in 2007.
2. Hopcroft J.E. and Ullman J.D., "Introduction to Automata, Languages and Computation", Narosa Publishing House, 1987.
3. Modern Algebra, S.Arumugam and A.Thangapandi Issac, New Gamma Publishing House, Revised Edition, Palayangottai
4. M.K.Venkataraman, Engineering Mathematics, Volume II, National Publishing Company, Second Edition, 2009

1702CA102	PROBLEM SOLVING AND C PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To understand the various problem solving techniques.
2. To understand the usage of top down design technique in problem solving.
3. To learn the syntax of C.
4. To get exposed to the file processing techniques of C.
5. To get familiarized with the pre-processor directives.

UNIT I PROBLEM SOLVING **9 Hours**

Introduction – The Problem–Solving Aspect – Top-Down Design – Implementation of Algorithms – Program Verification – The Efficiency of Algorithms – The Analysis of Algorithms.

UNIT II BASICS OF C PROGRAMMING **9 Hours**

Introduction– Keywords – Identifiers – Basic Data Types in C – Variables – Constants – Input / Output Statements in C – Operators in C – Conditional Branching Statements – Iterative Statements – Nested Loops – The Break and Continue Statements - Goto Statement.

UNIT III FUNCTIONS, ARRAYS AND STRINGS **9 Hours**

Functions-Definitions - Prototypes – Passing Parameters to the Function – Scope of Variables – Storage Classes – Recursive Functions - Arrays – Declaration – Usage – Passing Arrays to Functions – Reading and Writing Strings – String Operations.

UNIT IV POINTERS AND AGGREGATE DATA TYPES **9 Hours**

Pointer Variable Declarations and Initialization – Operators – Uses - Pointer Expressions and Pointer Arithmetic – Relationship between Pointers and Arrays – Arrays of Pointers – Pointers to Functions - Structures-Definition – Initialization – Unions – Bitwise Operators – Enumeration Constants.

UNIT V FILES AND PREPROCESSOR DIRECTIVES **9 Hours**

Introduction to Files – Using Files in C – Read and Write Data with Files - Random Access Files – Types of Pre-processor Directives –#define - # include- Conditional Directives.

TOTAL: 45 HOURS

FURTHER READING:

1. Apply Graphics commands in C language.
2. Demonstration of Test Data on programs.

COURSE OUTCOMES:

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

CO1: Design and implement C programs for a given problem.

CO2: Work with existing programs and modify it as per the requirements.

CO3: Identify the errors in a C program.

CO4: Identify the output of a C program without actually executing it.

REFERENCES:

1. R.G.Dromey, “How to Solve it by Computer”, Pearson Education, 2007.
2. Dr.Micheal Arock,” Fundamentals of Programming with C”, Yes Dee Publication, 2014.
3. ReemaThareja, “Programming in C”, OXFORD Higher Education, 2011.
4. Kernigan Brian W., and Dennis M. Ritchie, “The C Programming Language”, Second Edition, Prentice Hall, 1988.
5. Brian W. Kernighan and Rob Pike, “The UNIX Programming Environment”, Prentice Hall, 1984.

1702CA103	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
2. To make a study of SQL and relational database design.
3. To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
4. To know the fundamental concepts of transaction processing - concurrency control techniques and recovery procedure.
5. To have an introductory knowledge about the Storage and Query processing Techniques.

UNIT I RELATIONAL DATABASES **9 Hours**

Purpose of Database System – Views of data – Data Models – Database System Architecture – Entity Relationship model – E-R Diagrams - Introduction to relational databases - The relational Model – Keys - Relational Algebra – Relational Calculus – SQL fundamentals - Advanced SQL features – Embedded SQL – Dynamic SQL.

UNIT II DATABASE DESIGN **9 Hours**

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First – Second - Third Normal Forms - Dependency Preservation – Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT III DATA STORAGE AND QUERYING **9 Hours**

Overview of Physical Storage Media – RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measures of Query Cost- Selection Operation, Sorting, Join peration.

UNIT IV TRANSACTION MANAGEMENT **9 Hours**

Transaction Concepts - Transaction State – Implementation of Atomicity and Durability – Concurrent Executions- Serializability- Recoverability- Implementation of Isolation- Testing for Serializability- Lock Based Protocols- Time-Stamp based Protocols- Deadlock Handling-Failure Classification- Storage Structure-Recovery and Atomicity-Log-Based Recovery-Recovery with Concurrent Transactions.

UNIT V ADVANCED TOPICS **9 Hours**

OODBMS- Object-Based Databases - OO Data Model - OO Languages – Persistence – Object Relational Databases - XML – Structure of XML - Temporal Databases – Mobile Databases – Spatial Databases – Case Study for Design and Manage the Database for any Project.

TOTAL: 45 HOURS

FURTHER READING:

1. Data mining and Warehousing
2. Big Data

COURSE OUTCOMES:

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

CO1: Design and create tables in relational database and query them.
CO2: Know how transaction processing and concurrency control is done.
CO3: Compare different types of databases.

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2011
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
3. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson, 2008
4. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata McGraw Hill, 2010.
5. G.K.Gupta,"Database Management Systems", Tata McGraw Hill, 2011.
6. Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education, 2012.

1702CA104	DATA STRUCTURES	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

1. To gain comprehensive introduction of common data structures
2. To master the linear and hierarchical data structures and its applications
3. To learn about sorting techniques and disjoint set ADT

UNIT I LINEAR DATA STRUCTURES – LIST, STACK AND QUEUE 12 Hours

Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List Implementation – Doubly-Linked Lists – Circular Linked Lists – Applications – Cursor-Based Implementation of Linked Lists – Stack ADT: Implementation of Stacks – Applications - Queue ADT: Implementation of Queues – Applications of Queues-Priority Queues.

UNIT II HIERARCHICAL DATA STRUCTURES 12 Hours

Trees: Preliminaries – Implementation of Trees – Tree Traversals with an Application – Binary Trees: Implementation – Expression Trees – Search Tree ADT: Binary Search Trees.

UNIT III SORTING AND HASHING 12 Hours

Sorting – Bubble sort - Quick Sort - Insertion Sort – Heap sort – Hashing -Hashing functions - Collision Resolution Techniques - Separate chaining - Open addressing – Multiple hashing.

UNIT IV GRAPHS 12 Hours

Definitions – Representation of graph - Graph Traversals - Depth-first traversal – breadth-first traversal - applications of graphs - Topological sort – shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Biconnectivity – Euler circuits.

UNIT V ADVANCED DATA STRUCTURES 12 Hours

AVL Trees – B-Tree – R-B Tree - Binary Heap - D Heaps – Leftist Heaps – Skew Heaps – Binomial Heap

TOTAL: 60 HOURS

FURTHER READING:

1. Implementation of the data structures in different language platforms

COURSE OUTCOMES:

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

CO1: Describe, explain and use abstract data types including stacks, queues and lists

CO2: Design and Implement Tree data structures and Sets

CO3: Implement hashing techniques and heaps for applications

CO4: Implement a variety of algorithms for sorting

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education, 1997.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson education Asia, 1983.
4. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2007.

1702CA105	COMPUTER ORGANIZATION AND DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To understand the fundamentals of Boolean logic and functions.
2. To have a thorough understanding of the basic structure and operation of a digital computer.
3. To design and realize digital systems with basic gates and other components using combinational and sequential circuits
4. To discuss in detail about the operation of the arithmetic and logic unit.
5. To study the instruction sets and operation of a processor.
6. To study the different ways of communication with I/O devices and standard I/O Interfaces.
7. To study the hierarchical memory system including cache memories and virtual memory

UNIT I DIGITAL FUNDAMENTALS 9 Hours

Digital systems - Binary numbers – Octal - Hexadecimal conversions - Signed binary numbers – Complements - Logic gates - Boolean algebra- K-maps-Standard forms - NAND-NOR implementation.

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS 9 Hours

Combinational circuits - Adder- Subtractor - ALU design – Decoder - Encoder – Multiplexers - Sequential circuits – Latches - Flip-flops – Registers – Memories – Up-down Counters.

UNIT III PROCESSOR FUNDAMENTALS 9 Hours

Von-Neumann architecture- Processor – Definition – Structure – Category – Technology – ALU concept - Stored programs - Fetch execute cycle - Instruction formats - Clock rate instruction rate – Pipeline - Current processors - Multi core processors.

UNIT IV MEMORY 9 Hours

Physical memory – Addressing - Virtual memory - Address translation – Paging – Cache - L1-L2- L3 cache memories - Cache mapping – LRU replacement.

UNIT V DATA TRANSFER 9 Hours

Data transfer - Serial and Parallel data transfer - Full duplex - Half duplex interaction – Bus interface - Programmed I/O – Polling - Interrupt driven I/O - Hardware interrupt mechanism - Interrupt vectors - Multi level of interrupts – DMA - Buffer chaining - Operation chaining.

TOTAL: 45 HOURS

FURTHER READING:

1. VLIW architecture
2. Pentium processor

COURSE OUTCOMES:

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

CO1: Master the binary and hexadecimal number systems including computer arithmetic.
CO2: Design and implement digital systems with basic gates and other components using combinational and sequential circuits
CO3: Familiarize the Von Neumann architecture.
CO4: Familiarize the functional units of the processor and addressing modes, instruction sets.
CO5: Familiarize the memories and cache subsystem.

REFERENCES:

1. Morris Mano, "Digital design", Fourth edition, PHI/Pearson, 2006.
2. Douglas E.Comer, "Essentials of Computer Architecture", Sixth Edition, Pearson Education, 2012
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill , 2002.
4. William Stallings, "Computer Organization and Architecture – Designing for Performance", Seventh Edition, Pearson Education, 2006.
5. David A Patterson and John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Third Edition, Morgan Kaufmann / Elsevier, 2005

1702CA106	DATA STRUCTURES AND PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

1. To develop skills in design and implementation of data structures and their applications.
2. To learn and implement linear, non linear and tree data structures.
3. To learn Set ADT and Graph data structures and its applications.
4. To study, implement and analyze the different sorting techniques.

LIST OF EXPERIMENTS:

1. Writing Simple C Programs.
2. Conditional and Iterative Structures
3. Arrays, Functions and Strings.
4. Structures and Unions
5. Pointers.
6. File Handling.
7. List ADT implementation with arrays and linked lists.
8. Stack ADT implementation with arrays and linked lists.
9. Queue ADT implementation with arrays and linked lists.
10. BST implementation.
11. AVL implementation.
12. Hashing implementation – Separate Chaining algorithm.
13. Heap implementation – Priority Queues.
14. Sorting Algorithms – Insertion sort, Shell sort

TOTAL: 60 HOURS

ADDITIONAL EXPERIMENTS:

1. Algorithm Design Dynamic Programming and Heuristics
2. Algorithm Design Greedy and Backtrack

COURSE OUTCOMES:

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

1. Work with basic data structures that are suitable for the problems to be solved efficiently.
2. Design and implement linear, tree, and graph structures and its applications.
3. Design various sorting techniques, its algorithm design and analysis.

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education, 1997.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson education Asia, 1983.
4. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2007.

1702CA107	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

1. To understand the concepts of DBMS.
2. To familiarize with SQL queries.
3. To write stored procedures in DBMS.
4. To learn front end tools to integrate with databases.

LIST OF EXPERIMENTS:

1. Data Definition - Manipulation of Tables and Views.
2. Database Querying – Simple queries - Nested queries - Sub queries and Joins.
3. Triggers.
4. Transaction Control.
5. Embedded SQL..
6. Database Connectivity with Front End Tools.
7. Front End Tools / Programming Languages..
8. High level language extensions - PL/SQL Basics.
9. Procedures and Functions.
10. Database Design and Implementation (Case Study).

TOTAL: 60 HOURS

ADDITIONAL EXPERIMENTS:

1. Menu Design
2. Report Generation

COURSE OUTCOMES:

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

1. Design and Implement databases.
2. Formulate complex queries using SQL.
3. Design and Implement applications that have GUI and access databases for backend connectivity

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008
4. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata McGraw Hill, 2010.
5. G.K.Gupta,”Database Management Systems”, Tata McGraw Hill, 2011.
6. Frank. P. Coyle, “XML, Web Services And The Data Revolution”, Pearson Education, 2012.
7. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011

1704CA108	LIFE SKILL I – BUSINESS ENGLISH	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. To help students understand and develop the necessary skills to equip them for whatever career path they choose.
2. To guide students in making responsible decisions, to create a desire and to fulfill individual goals by improving their soft skill.
3. To get better students reading, listening, writing and speaking skills by breaking their barriers.
4. To help students improve their problem solving skills by ignite their minds through aptitude sessions.

UNIT I **4 HOURS**

Career Opportunities

Industry Expectations

UNIT II SOFT SKILL TRAINING **6 HOURS**

Introduction to Soft Skill **–** motivational programming – personality development – self confidentiality – inner confidence beauty.

UNIT III GOAL SETTING **4 HOURS**

Environmental awareness **–** Genetic Engineering – people management – time management - domain management – communication skills – trait attitude skills & videos

UNIT IV **8 HOURS**

Communication skills **–** ICE breaking and activity sheets.

UNIT V APTITUDE **8 HOURS**

Numbers: basics **–** H.C.F & L.C.M of numbers- Decimal fractions and problems on numbers.

TOTAL: 30 HOURS

COURSE OUTCOMES:

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

CO1: Understand how to make out opportunities in their career path.

CO2: Apply their soft skills in making decision in order to solve issues in their everyday life.

CO3: To some extent improvement in their reading, writing and speaking skills

CO4: Started to solve problems in a swift way.

REFERENCES:

1. You Can Win – Shiv Khera.
2. Soft Skills Training: A Workbook to Develop Skills for Employment Paperback – Large Print, May 2012 by Frederick H. Wentz .
3. Steven Covey – 7 Habits of Effective people 67.
4. How to Prepare for Quantitative Aptitude for the CAT Paperback – Jun 2016 by, Arun Sharma