

**Title of the subject: Programming in C
Course Code: MCA110**

Teaching Scheme:
Lectures: 3 hrs/week
Tutorial: 1Hr/week
Credits: 4

Examination Scheme:
Theory Paper: 80 Marks [3 hrs]
Class Test: 20 Marks

Course Objectives:

- To develop programming logic to solve basic computing problems
- To learn the syntax and usage of C programming constructs
- Provide extensive hands on for C programming

Course Outcome:

At the end of the course students will be able to:

- Solve the given problem using the syntactical structures of C language
- Develop, execute and document computerized solution for various problems using the features of C language
- Read and write C program that uses Pointers, Structures and Files

Prerequisites: Basic knowledge about computers hardware and software, Mathematical and logical aptitude

Unit 1: Problem Solving: Algorithm and Flowchart

Introduction to C: Overview, Importance of C, Character set. C Tokens: Keywords and Identifiers, Constants and Variables, Data types, Declaration of Variables, Defining Symbolic Constants. Operators and Expressions: Arithmetic, Relational, Logical, Assignment operators, Increment and Decrement, Conditional, Bitwise and Special operators, Expressions, Operator precedence and associativity, Type casting [10 Hrs]

Unit 2: Data Input-Output: Basic structure of C program, Character Input and Output, String Input and Output, Formatted Input and Output. Control Structures: Decision making - if, switch statement, Loop Control – while, do while and for statement, Nested loops, break and continue statement, goto statement .

Arrays: Introduction, Array declaration and Initialization, Type – One dimensional, Two dimensional and Multi dimensional Arrays [12 Hrs]

Unit 3: Functions: Introduction, Standard Library Functions, User Defined Functions Declaration (prototype), Definition, Function call, Parameter Passing - by value and by reference, Recursion, Passing Array to Function, Storage Classes Structure: Defining Structure, Declaration, Initialization of Structure, Array of Structures, Arrays within Structure, Structure and Functions, Nested Structures, Unions, Enumerated data type, typedef [10 Hrs]

Unit 4: Pointers: Pointer Variables, Operators, Declaration, Initialization, Pointer Arithmetic, Functions and Pointers, Pointers and Arrays, Structures and Pointers, Pointers and Strings, Pointer to Pointer, Dynamic Memory Allocation

File Handling: File system basics, File operations, File opening modes, String I/O in files, and Record I/O in files, Text and Binary files, Random Access to files, Command Line Arguments [08 Hrs]

Text Books:

- 1 The Complete Reference C - HERBERT SCHILDT, Tata McGraw-Hill
- 2 The C Programming Language – Kernighan BW, Dennis M. Ritchie, Prentice Hall
- 3 Programming in ANSI C, E. Balagurusamy, Tata McGraw Hill

Reference Books:

- 1 Programming with C – Byron Gottfried – Tata McGraw-Hill
- 2 Let us C, Yashavant Kanetkar, BPB Publication
- 3 Exploring C, Yashavant Kanetkar, BPB Publication
- 4 Understanding Pointers in C, Yashavant Kanetkar, BPB Publication

Digital Reference:

- 1 <http://www.cprogramming.com/tutorial/c-tutorial.html>
- 2 <http://www.tutorialspoint.com/cprogramming/>
- 3 <http://nptel.ac.in/courses/106104128/>
- 4 <http://nptel.ac.in/courses/106105085/1>

Title of the subject: Discrete Mathematical Structures

Course Code: MCA111

Teaching Scheme:

Lectures: 4 hrs/week

Credits:4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Course Objective:

- To understand sets probability, relations and functions.
- To use sets, probability, relations and functions concepts to solve problems
- To relate the ideas of mathematical induction to recursion and recursively defined structures
- To learn graphs and trees.

Course Outcome:

Student will be able to –

- Apply the skill of discrete mathematics to solve real life problems
- Apply these concepts to various areas of computer science

Course Prerequisite:

- Basic Mathematics.

Unit 1:Sets and Propositions: Combination of sets, Finite & Infinite Sets, Mathematical Induction, Propositions, Logical Connectives, Well-Formed Formulas, Tautologies, and Logical Equivalences.

Permutations, Combinations & Discrete Probability: The Rules of Sum & Product, Permutations, Combinations, Generation of Permutations & Combinations, Discrete Probability, Conditional Probability. [12 Hrs.]

Unit 2: Relations and Functions: Properties of Binary Relations, Closure of Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains and Anti-chains, A Job-Scheduling Problem, Functions and Pigeonhole Principles. [8 Hrs.]

Unit 3:Graphs : Basic Terminology, Multigraphs and Weighted Graph, Paths& Circuits, Shortest Path in Weighted Graph, Eulerian Path & Circuits, Hamiltonian Path & Circuits, Traveling Salesman Problem, Factors of a Graph, Planner Graph.

Trees: Trees, Rooted trees, Path Length in Rooted Trees, Prefix Codes, Binary Search Tree, Spanning Tree & Cut-Sets, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm. Transport network. [10 Hrs.]

Unit 4: Discrete Numerical Functions and Generating Functions: Manipulation of Numeric Functions, Asymptotic behavior, Generating functions and Combinatorial Problems, Recurrence Relations: Recurrence Relations, Linear Recurrence Relations with constant Coefficients, Homogeneous solutions, Particular Solutions, Total Solutions, Sorting algorithm, Divide and conquer algorithm. [10 Hrs.]

Text Books/Reference Books:

- 1 C.L.Liu , "Elements of Discrete Mathematics", Tata McGraw-Hill Publication
- 2 Kollman, Busby and Ross, "Discrete Mathematical Structures", PHI
- 3 Discrete Mathematical Structures with Application to Computer Science (Mcgraw Hill - New Delhi) By Tremblay, J.P. & Manohar
- 4 Discrete Mathematics and Its Applications (Mcgraw Hill - New Delhi) By Rosen, Kenneth L.
- 5 Discrete Mathematics by Seymour Lipschutz, Marc Lipson(Schaum's Series)

Digital Reference:

- 1 <http://www.nptel.iitm.ac.in>

Title of the subject: Accounts & Financial Management

Course Code: MCA112

Teaching Scheme:

Lectures: 4 hrs/week

Credits: 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Course Objective:

This course provides an introduction to financial and management accounting. It is aimed at providing a broad understanding of the theory and practice of financial accounting, management accounting and financial management, both for non-specialist students and as a foundation for further study in the area.

Course Outcome:

Student will be able to –

- Acquire knowledge about general aspects of business operations.
- Analyze financial data from annual reports of corporations

Course Prerequisite:

- Understanding of decision-making, Basic Mathematics.

Unit 1:Fundamentals of Accountancy and accounting statement: Basic Accounting terms, Financial Accounting: Double Entry Accounting system, Classification of accounts, Concepts and conventions in accounting, Accounting process, Depreciation. Journalisation: Rules for Journalisation, posting in a ledger, subsidiary books, preparation of trial balance, Bank

Reconciliation statement. Final Accounts: Preparation of Trading and profit and loss Account and Balance sheet of a proprietary firm. [14 Hrs.]

Unit 2: Ratio Analysis: Ratio analysis: Introduction, Liquidity ratios, Leverage ratio, Profitability Ratio and Activity Ratio. [6 Hrs.]

Unit 3: Cost Accountancy: Cost Accounting: Advantages of Cost Accounting, Comparison with financial accounting, Classification of Cost, Cost volume profit analysis, Break-even chart, Advantages and limitations of Break even chart. [12 Hrs.]

Unit 4: Budget and Budgetary Control: Definition and objective, Preparation of various types of budgets including cash budget, fixed budget and flexible budget. [8 Hrs.]

Text Books/Reference Books:

- 2 V. K. Saxena & C. D. Vashist "Essentials of Cost Accounting"
- 3 Khan and Jain "Management Accounting", Tata Mcgraw Hill.
- 4 A.P. Rao, Management Accounting", EPH
- 5 Satish Inamdar, Cost and Management accounting", Everest Publishing House.
- 6 Dr.Sanjay Patankar, Management Accounting",
- 7 Dr.Mahesh Kulkarni , Management Accounting",
- 8 T.S. Grewal, Element of Accounts, S. Chand & Co.
- 9 Accounting and financial management by Ramchandran T – Scitech publication
- 10 Management accounting principles by R.N. Anthony and J.S.Reece

Digital Reference:

- 1 <http://www.nptel.iitm.ac.in>

Title of the subject: Computer Network

Course Code: MCA 113

Teaching Scheme:

Lectures: 3 hrs/week

Tutorial: 1hr/week

Credits : 4

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Course Objective:

- To train the students on basic principles of Computer Networks.
- To learn the Networking concepts and methodologies.

Course Outcome:

Student will be able to –

- Recognize the different internetworking devices and their functions.
- Explain the role of protocols in networking.
- Analyze the services and features of the various layers of data networks.

Course Prerequisite:

- Understanding of basic concepts of data communication.

Unit 1: Introduction: Data Communication, Networks, The Internet, Protocols and Standards, Layered Tasks. The OSI Model, Layers in OSI Model, TCP/IP Protocol suite, Addressing.

Physical Layer-1: Analog and digital Signals, Transmission impairment, Data Rate limits, Performance, Digital-Digital Conversion(Only Line Coding: Polar, Bi-Polar and Manchester Coding), Analog to Digital Conversion(Only PCM), Transmission Modes, Digital-To-Analog Conversion. [10 Hrs]

Unit 2: Physical Layer-2 and Switching: Multiplexing, Spread Spectrum, Introduction to Switching, Circuit Switched Network, datagram Network, Virtual Circuit Networks.

Data Link Layer -1: Error Detection and Error Correction: Introduction, Block Coding, Linear Block codes, Cyclic Codes, Check sum. [10 Hrs]

Unit 3 :Data Link Layer 2: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, PPP (Framing, Transition Phase only)

Multiple Access & Ethernet: Random Access, Controlled Access, Channelization, Ethernet: IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet

Unit 4: Wireless LAN's and Cellular Networks: Introduction, IEEE 802.11, Bluetooth, Connecting Devices, Cellular Telephony.

Network Layer: Introduction, Logical addressing, IPv4 addresses, IPv6 addresses, Internetworking basics, IPv4, IPv6, Comparison of IPv4 and IPv6 Headers. [10 Hrs]

Text Books/Reference Books:

1. Computer Networks Andrew S. Tanenbaum, Pearson, 5th Ed.
2. Data Communications and Networking Behrouz A. Forouzan.
3. Network Essential Notes GSW MCSE Study Notes.
4. Internetworking Technology Handbook CISCO System.
5. Computer Networks and Internets with Internet Applications Douglas E. Comer.

Digital Reference:

1. <http://videolectures.net>

Title of the subject: Computer Organization

Course Code: MCA114

Teaching Scheme:

Lectures: 2 hrs/week

Credits: 2

Examination Scheme:

Theory Paper: 50 marks [2 hrs]

Course Objective:

To give basic knowledge of microprocessor, its architecture its components.

Course Outcome:

Student will be able to –

- 1 Understand structure of a computer system
- 2 Get acquainted with low language programming.

Unit1: Computer components and function: Computer components, Interconnection structures, Bus interconnection and PCI.

Computer Architecture: The arithmetic and Logical Unit, Integer representation, Integer arithmetic, Floating-point representation, Floating-point arithmetic. [5 Hrs]

Unit 2: Memory: Cache memory, internal memory and external memory.

Input/ output: External devices, I/O modules, Programmed I/O, Interrupt driven I/O, Direct Memory Access. [5 Hrs]

Unit 3: Process structure and function: Processor organization, Instruction cycle. [5 Hrs]

Unit 4: 8086 Microprocessor: Architecture and instruction set. [5 Hrs]

Text/ Reference Books:

- 1 Computer Organization and Architecture by William Stallings (8th Ed)
- 2 Computer Architecture and Organization by John P. Hayes
- 3 8086 Family , Programming and interfacing – By John P. Uffenbeck, PHI 2001
- 4 Yu Chen Liu & Glenn A Gibson : Microcomputer Systems; The 8086/8088 Family, PHI

Title of the subject: Soft Skills

Course Code: MCA115

Teaching Scheme:

Lectures: 2 hrs/week

Credits: 2

Examination Scheme:

Theory Paper: 50 marks [2 hrs]

Objectives:

- To equip students with effective speaking and listening skills in English
- To help them develop their soft skills and people skills, that will make the transition from college to workplace smoother and help them to excel in their jobs.
- To enhance students' performance at Placement Interviews, Group Discussions and other recruitment exercises.

Unit 1: Introduction: Introduction to Communication: Need of Effective Communication, Communication Model, Formal and Informal Introduction, Inter personal Communication, Inter Cultural Communication.

Communicative English Grammar: Noun, Pronoun, verbs, Tenses: Simple present tense, Present continuous Tense, Present perfect tense, Present perfect continuous Tense, Past tense: Simple past tense, Past continuous tense, Past perfect tense, past perfect continuous Tense, Future Tense: Simple future Tense, Simple Present Tense, Present Continuous Tense, future continuous Tense, Future perfect Tense. [5 Hrs]

Unit 2: Comprehension skills: Preview Techniques, Skimming, Scanning, Undertaking the gist of an argument, identifying the topic sentence, Inferring lexical and contextual meaning; recognizing coherence and Sequencing of sentence, improving comprehension skills

Conversations: Face to Face Conversation, Telephone conversation, Role play activities.

Business Correspondence: Principles of letter writing, Job Application with Resume, Leave Applications, Placing and fulfilling orders, Complains and Apologies. Circular Letter, Proposal writing. [5 Hrs]

Unit 3: Interviews: Types of Interview, Preparing for the Interview, Types of Interviews, Interview Questions, Direct Questions, Open ended questions, closed questions, How to crack an Interview- Video Samples

Group Discussion: Why is GD part of selection process? – Structure of a GD – Moderator-led and other GDs ,Strategies in GD, Team work , Body Language – Video Samples. [5 hrs]

Unit 4:Soft Skills, Time Management, Articulateness, Assertiveness, Psychometrics, Innovation and Creativity, Stress Management & Poise – Video Samples.

Presentation Skills: Strategies for developing Self Confidence, Elements of an effective presentation, Structure of a presentation, Presentation tools, Voice Modulation, Audience analysis, Body Language – Video Samples. [5 hrs]

Text Books:

- 1 Meenakshi Raman and Sangeetha Sharma, Technical Communication- Principles and Practice, Oxford University Press; New Delhi(2004)
- 2 Barker. A- Improve your Communication Skills – Kogan Page India Pvt. Ltd. ,New Delhi(2006)

Reference Books:

- 1 Adrian Doff and Christopher Jones- Language In Use (Upper-Intermediate),Cambridge
- 2 University Press, First South Asian Edition(2004)
- 3 John Seely, The Oxford Guide To Writing and Speaking, Oxford University Press , New Delhi
(2004)
- 5 Meenakshi Raman and Sangeetha Sharma, Technical Communication – Principles and Practice, Oxford University Press, New Delhi (2004)
- 6 Barker. A - Improve your communication skills – Kogan Page India Pvt Ltd, New Delhi (2006)
- 7 Adrian Doff and Christopher Jones – Language in Use (Upper-Intermediate), Cambridge
- 8 University Press, First South Asian Edition (2004)
- 9 John Seely, The Oxford Guide to writing and speaking, Oxford University Press, New Delhi
(2004)
- 10 (2004)

Digital Reference:

- 1 <http://www.words300.com/ebooks/15ways.pdf>
- 2 <http://www.talkenglish.com/>
- 3 <http://testfunda.com/examprep/websitelpages/gdpilessons/VideoGDPI.aspx>

Title of the subject: Programming in C
Course Code: MCA116

Teaching Scheme:

Practical: 2 hrs/week

Credits: 1

Examination Scheme:

Practical Exam: 50 Marks

Suggested List of Experiments:

- 1 Program using if and/or switch control structure.

- 2 Programs based on for loop, while loop, do-while loop and their combinations.
- 3 Program for one dimensional array (eg. Search an element in the array).
- 4 Program for sorting an array.
- 5 Program to read and print a matrix, also add two matrices.
- 3 Programs based on functions (Library functions and User Defined Function, Recursion)
- 6 Program using pointers.
- 7 Program based on Structure and Union.
- 8 Program based on Files and Command Line Arguments (File handling functions)

Note: Minimum 10 programs from suggested list, out of them 3 programs should be carried out preferably on open source platform

Every practical assignment will include:

- | | | |
|---------------|-------------|---|
| (1) Title | (2) Aim | (3) Theory |
| (4) Algorithm | (5) Program | (6) Input & output (7) Handrun for sample data |

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Title of the subject: Computer Organization
Course Code: MCA 117

Teaching Scheme:
Practical: 2 hrs/week
Credits: 1

Examination Scheme:
Term work: 50 Marks

Termwork will consist of 08 programs using 8086 ALP & 3 Assignments based on Unit 1,2 & 3.

TERM WORK: The assessment on the term work shall be done on the following criteria:

1. Continuous assessment.
2. Presentation on case study.

Oral examination on the syllabus and the term work, mentioned above.

Title of the subject: Soft Skills
Course Code: MCA118

Teaching Scheme:
Practical: 2 hrs/ week
Credits: 1

Examination Scheme:
Termwork: 50 Marks

Suggested List of Experiments:

- 1 Formal and Informal Introduction about themselves
- 2 Writing and describe an Event/Incident/Experience without grammatical mistakes

- 3 Phonetics Intonation , Ear Training ,Correct Pronunciation ,Eye contact
- 4 Assignment on Report Writing, Letter Writing and Memo Writing
- 5 Structuring their own resume and the cover letter in the Industry required format
- 6 Ethics to be followed in different types of E-mail communication
- 7 To conduct Mock Interviews and provide feedback on what and how to improve.
- 8 To conduct Mock GD and provide feedback on what and how to improve.
- 9 Ethics to be followed in Telephonic Communication
- 10 Presentation Skills: Students make presentations on given topics using gestures and eye contact

TERM WORK: Term work shall consist of minimum of 10 programs/Assignments to be developed based on the above syllabus .The assessment on the term work shall be done on the following criteria:

1. Continuous assessment.
2. Performing the Experiment in the Lab.
3. Oral examination on the syllabus and the term work, mentioned above.

Title of the subject: Web Technology Lab

Course Code: MCA119

Teaching Scheme:

Practical: 2 hrs/ week

Credits : 1

Examination Scheme:

Practical Exam: 50 marks

Term work: 50 Marks

Course Objective:

- To understand web essentials of internet
- To understand fundamentals concepts for developing static web pages
- To learn client side scripting and markup languages
- To design and develop simple static web applications using client side scripting languages

Course Outcomes:

Students will be able to:

- Understand, analyze and apply the role of HTML, CSS, XML, JavaScript, and protocols in the workings of the web and web applications
- Build static web pages and validating using JavaScript (client side programming).
- Create XML documents and XML schemas
- Conceptualize, design, and implement a working, medium sized project individually or in a team.

Course Prerequisite:

- Understanding of basic computer programming.

- 1 Introduction to web terminologies: History of internet, WWW, URL and HTML, Protocols, Web browsers, Web servers.

- 2 HTML and CSS: Basic HTML tags, Different types of HTML tags, Basics of CSS, Types of CSS, Simple web page designing using HTML and CSS.
- 3 Client side scripting – JavaScript: Introduction to JavaScript, Variables and identifiers, Operators and types, Controls and looping structures, Arrays, Different Objects and predefined functions, DOM ,Validating form using JavaScript.
- 4 XML: Introduction to XML, XML with CSS, DTD, XML Schema and namespace, XSLT.

TERM WORK: Term work shall consist of minimum of 10 programs/Assignments to be developed based on the above syllabus and a mini project. The assessment on the term work shall be done on the following criteria:

- 1 Continuous assessment.
- 2 Performing the Experiment in the Lab.
- 3 Oral examination on the syllabus and the term work, mentioned above.
- 4 50% weightages should be given for mini project in termwork and external practical examination.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments and mini project submitted by the candidate.

Mini Project: Guidelines for Mini Project:

- 1 Allow minimum 1 to maximum 2 students per mini project group
- 2 Take the topic from students in first 15 days from the start of the semester.
- 3 The project report is to be submitted at the end of semester.

Text Books/Reference Books:

- 1 Internet & World Wide Web: How to Program, 4/E Pub - by Harvey Deitel-2006
- 2 HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Publications
- 3 Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML Black Book by Kogent Learning Solutions Inc
- 4 XML: The Complete Reference – by Heather Williamson

Digital References:

- 1 www.w3schools.com
 - 2 www.javatpoint.com
 - 3 www.studytonight.com
-

Title of the subject: Object Oriented Programming Using C++
Course Code: MCA120

Teaching Scheme:
Lectures: 3 hrs/week
Tutorial: 1 Hr/week
Credits: 4

Examination Scheme:
Theory Paper: 80 marks [3 hrs]
Class Test: 20 Marks

Course Objectives:

- To learn the Object-Oriented approach to programming
- To develop programming skills in C++ language
- To train students to exploit Object-Oriented features effectively in real world

Course Outcome:

At the end of the course students will be able to:

- Design, write and test programs that make appropriate use of advanced techniques of C++ (such as encapsulation, inheritance, polymorphism, exception handling, templates etc.)
- Analyze and design a computer program to solve real world problems based on object-oriented principles

Prerequisites:

Knowledge of C Programming (Procedural Programming)

Unit 1: Introduction to C++: Procedural Vs Object Oriented Programming, characteristics of object oriented programming.

C++ Programming Basics: Keywords, Constants and Variables, Data types, Operators, Type conversions, Output with cout, Input with cin, Preprocessor directives, Cascading and Manipulators. Decisions and Loops statements, Array, Structure, Functions. [12 Hrs]

Unit 2: Classes and Objects: Class, Object, Class members, Access specifiers, Arrays as class Member Data, Arrays of object, Scope resolution operator, Static class members, Object as function arguments, Returning an object from function, Friend function, Function overloading, Default arguments, Inline function

Constructor and Destructor: Constructor, Types of constructor, Destructor

Pointers: Introduction, pointer to object, this pointer, pointer to derived classes, Memory management: new and delete operator. [10 Hrs]

Unit 3: Operator Overloading: Overloading unary and binary operators using member function and friend function, Pitfalls of Operator Overloading, Data Conversion

Inheritance: Concept of Inheritance, Derived class and Base class, Types of Inheritance, Public and Private Inheritance, Constructors, Destructor and Inheritance, Virtual base class, Containership

Polymorphism: Virtual functions, Pure virtual functions, Abstract class, Virtual destructors

[10 Hrs]

Unit 4: File I/O: Streams, Stream class hierarchy, Formatted file I/O, Character I/O, Binary I/O, File pointers, Command Line Arguments

Exception Handling: Simple exceptions, multiple exceptions

Templates: Introduction to Templates, Function Templates, Class Templates. [08 Hrs]

Text Books:

- 1 Object Oriented Programming In C ++ Robert Lafore, Galgotia
- 2 The Complete Reference C++ - HERBERT SCHILDT, Tata McGraw-Hill

Reference Books:

- 1 Object Oriented Programming with C++, E. BALAGURUSAMY, Tata McGraw Hill
- 2 Let us C++ Yashavant Kanetkar, BPB publication
- 3 The C++ Programming Language - Bjarne Stroustrup

4 Programming with C – Byron Gottfried – Tata McGraw-Hill

Digital Reference:

- 1 <http://www.cplusplus.com>
- 2 <http://www.cprogramming.com/tutorial/c++-tutorial.html>
- 3 www.tutorialspoint.com/cplusplus/

Title of the subject: Operating System

Course Code: MCA121

Teaching Scheme:

Lectures: 3 hrs/week

Tutorial: 1 Hr/week

Credits: 04

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Objectives:

The objective of this course is to provide an introduction to the internal operation of modern operating systems. In particular, the course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems.

Course Outcomes:

By the end of the course students will be able to describe the basic principles used in the design of modern operating systems.

Unit 1: Introduction :Overview of all system software, Operating system, I/O Manager, Assembler, Compiler, Linker, Loader, Principles of I/O hardware and software, Types of Operating System and Operating System Structure

Fundamentals of OS : OS services and components, multitasking, multiprogramming, buffering, spooling, System calls and types of system calls. [10 Hrs]

Unit 2: Process Management: Process concept and Scheduling, Inter process Communication, Threads ,Threads Vs Process

Process Synchronization: Critical Section Problem, Semaphores, Classical Problems of process Synchronization

Deadlocks: System model, Deadlock Characterization, Methods of handling Deadlocks, Dead lock prevention, deadlock avoidance, Deadlock detection and recovery from deadlock. [10 Hrs]

Unit 3: Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation.

Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.

Secondary Storage Management: Disk Structure, Disk Scheduling, Algorithm, RAID. [10 Hrs]

Unit 4: File System: File System structure, File system implementation, Directory structure and Implementation, Allocation Method, VFS

Special Purpose Operating System: Basics of Multimedia Operating System, Real Time Operating System and Distributed Operating System [10 Hrs]

Text Books:

1. Operating System Principles By Silberschatz, Galvin, Gagne (Seventh Edition)
2. Operating System-Internal and Design Principles by William Stallings (Sixth Edition)
3. Modern Operating System By Andrews Tanenbaum

Reference Books:

1. Operating System –A Concept-Based Approach By Dhamdhere (Second Edition)
2. Operating System by Dietel, Chofenes

Digital Reference:

1. http://en.wikipedia.org/wiki/Operating_system
2. <http://nptel.iitm.ac.in/>

Title of the subject: Software Engineering

Course Code: MCA122

Teaching Scheme:

Lectures: 4 Hrs/Week

Credits : 4

Examination Scheme:

Theory Paper: 80 Marks [2 hrs]

Class Test: 20 Marks

Course Objective:

- To learn and understand Software Development Life Cycle.
- To train the students on basic principles of software engineering used in the industry.
- To apply project management and requirement analysis principles and design and testing principles to S/W project development

Course Outcome:

Student will be able to –

- Compare and choose a process model for a Software Project Development.
- Analyze and model software requirements of a Software System.
- Plan and Manage the Software Projects.
- Design and Modeling of software system with tools.

Unit 1:Introduction to Software Engineering: Define Software, Software Characteristics, Software Applications, Software Myths, Need of Software, Evolving role of software, Define Software Engineering, Software Engineering a Layer Process.

Software Process Model: A Generic Process Model, Prescriptive Process Model, Specialized Process Model, Unified Process, Personal and Team Process Model. [8 Hrs]

Unit 2: Software Requirements and Development Principles, Requirement Engineering, Establishing the groundwork, Eliciting requirements, Quality Function Deployment (QFD)

Core Principles: Principles that guide the process, Principles that guide Practice, Principles that guide each framework activity, Planning Principles, Modeling Principles, Requirement modeling Principles, Design modeling Principles, Construction Principles, Testing Principles, Deployment Principles.

Requirement Specifications: SRS, SRS Structure and Contents of the SRS, Types of Requirements-Functional and Non-Functional Requirements, Requirement Definition.

[10 Hrs]

Unit 3:Software Project Planning and Management: The management spectrum, Project Planning process, Software Scope and Feasibility, Problem Decomposition, Process Decomposition, Process and Project Metrics, Size and Function Oriented Metrics, Reconciling LOC and FP Metrics, Software Project Estimation, Decomposition techniques, Empirical estimation models

Project Scheduling: Basic Concepts and Principles, Work Breakdown Structure, Task Network/Activity Networks, Gantt chart, PERT Chart, CPM.

Risk Management: Reactive versus Proactive Risk Strategies, Risk Identification, Assessing Overall Project Risk, Risk Projection, Developing a Risk Table, Assessing Risk, Risk Plan.

[12 Hrs]

Unit 4: Analysis and Design: Decision Tree, Decision Table, Structured English, Functional Decomposition Diagrams, Data Flow Diagram (Physical and Logical), Entity Relationship Diagram, Data Dictionary-Definitions, Components, UML Diagrams (Structural and Behavioral) Design Concepts- Design Process, Design concepts, Design Model, Architectural styles, Designing class based components, Golden Rule of user interface design
Coding- TOP-DOWN and BOTTOM-UP structure Programming, Information Hiding, Programming Styles and Internal Documentation
Software Testing-Testing Strategies, Levels of Testing, Types of Testing,
An overview of Maintenance and Rework.

[10 Hrs]

Text Books/Reference Books:

- 1 Software Engineering A Practitioner's Approach, Roger S. Pressman, McGraw-Hill International Edition, 7th Edition.
- 2 Software Engineering, K. K. Aggarwal, Yogesh Singh, New Age International Publishers Second Edition.
- 3 An Integrated Approach to Software Engineering, Pankaj Jalote Narosa Publishing House, Third Edition.
- 4 Software Engineering, Ian Sommerville, Addison Wesley 9th Edition.
- 5 System Analysis and Design, S. Parthsarthy, B.W. Khalkar

Title of the subject: Data Structures Using C

Course Code: MCA123

Teaching Scheme:

Lectures: 4 hrs/week

Credits: 04

Examination Scheme:

Theory Paper: 80 marks [3 hrs]

Class Test: 20 Marks

Course Objectives:

- To introduce algorithmic analysis, fundamental data structures, problem solving paradigms
- To study the representation, implementation and application of basic data structures.
- To introduce algorithmic strategies and time complexity analysis of problems.

Course Outcome:

Student will be able to –

- Apply basic search and sort algorithms to solve the time and space complexity problems in the programming.
- Synthesize a variety of advanced abstract data type (ADT) and data structures and their implementations.
- Distinguish between different algorithm designs technique and there importance.

- Apply the learned algorithm design techniques and data structures to solve the memory management and programming optimization problem.

Course Pre-requisites

Fundamentals of C Language.

Unit 1: Introduction: Data Structures, types, importance, Abstract data Type.

Array: Arrays in C, Dynamically Allocated Arrays, One and two Dimensional arrays, Multi Dimensional Arrays, Structures and Unions.

Stack: LIFO structure, PUSH and POP operations, delete stack.

Queue: FIFO structure Priority Queues, Circular Queues, operations on Queues.

Hash Function: Address calculation techniques, Common hashing functions ,Collision resolution ,Linear probing, Quadratic probing. [10 Hrs]

Unit 2: Linked List: Create List, Insert node (empty list, beginning, middle, end), Delete node(First, general case), searching in a list, retrieve node, add node, remove node, print list, append linked list, array of linked lists.

Complex Linked List Structures: Header nodes, Circularly-Linked List, Doubly Linked List, Multilinked lists. [10 Hrs]

Unit 3: Tree: General tree terminology, tree traversal, polish notations, Concept and basic Operations on binary tree, Threaded Binary tree, Binary Search Tree, Heap. [10 Hrs]

Unit 4: Graphs: Operations (Add vertex, Delete Vertex, Add Edge, Delete Edge, Find

Vertex), Traverse Graph (Depth-First, Breadth-First), Graph Storage structures (Adjacency Matrix, Adjacency List) , Minimum Spanning Tree, Kruskal's algorithm, Prim's algorithm,

Sorting Technique: Bubble, Insertion, Selection, Quick sort, Radix sort [10 Hrs]

Text Books:

- 1 Fundamentals of Data Structures in C [2 nd Edition], Ellis Horowitz, Sartaj Sahani, Susan Anderson Freed, Universities Press.
- 2 Data structure by Lipschutz, MGH

Reference Books:

- 1 Data and file structure by A. Tanenbaum by PHI
- 2 Data structure using C by Tremblay

Digital Reference:

- 1 <http://www.roseindia.net/tutorial/datastructure>

Title of the subject: Database Management System

Course Code: MCA124

Teaching Scheme:

Lectures: 2 hrs/week

Credits : 2

Examination Scheme:

Theory Paper: 50 marks [2 hrs]

Course Objective:

The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.

Course Outcome:

Student will be able to –

- Understand, use & design the databases.
- Access and manipulate the DBMS.

Course Prerequisite:

- Elementary knowledge about computers
- Knowledge about programming in some common programming language.

Unit 1: Basic concepts: Database and Need for DBMS, Characteristics of DBMS, Database Users, 3-tier architecture of DBMS (its advantages over 2-tier), Data Models, Views of data-schemas and instances, Data Independence, Conventional data models & systems

[6 Hrs.]

Unit 2: Database Design using ER model: Entities, Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys, Expressing M: N relation [5 Hrs.]

Unit 3: Relational Database design: Database Design–ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys. [4 Hrs.]

Unit 4: SQL Concepts : Basics of SQL, DDL, DML, DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types. [5 Hrs.]

Text Books/Reference Books:

- 2 Elmasri and Navathe : Fundamentals of DataBase Systems (5th Ed.).
- 3 Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 4th Edition,
- 4 ISBN : 0-07-120413-X, Tata McGraw-Hill.
- 5 Database management System, Bipin Desai
- 6 Raghu Ramakrishnan/Johannes Gehrke, “Database Management Systems”, Tata Mc Graw Hill
- 7 Introduction to database systems C.J.Date
- 8 Oracle by Ivan N. Bayross

Digital Reference:

- 1 <http://nptel.iitm.ac.in/>

Title of the subject: Computer Oriented Numerical Methods

Course Code: MCA125

Teaching Scheme:

Lectures: 2 hrs/week

Credits : 2

Examination Scheme:

Theory Paper: 50 marks [2 hrs]

Course Objective:

The purpose of numerical analysis is to find acceptable approximate solutions when exact solutions are either impossible and to devise alternate methods of solution better suited to the capabilities of computers.

Course Outcome:

Student will be able to –

- Demonstrate common numerical methods and how they are used to obtain approximate solutions to various types of problems in engineering and science.
- Analyze and evaluate the accuracy of common numerical methods.

Course Prerequisite:

- Calculus, Linear algebra.

Unit 1: Introduction and Roots of Equation: Type of error, Accuracy, Round off and stability, Propagation of error, Bisection method, Regula -Falsi method, Newton-Rapson method.

Linear Algebraic Equations - Gauss Elimination methods, LU decomposition technique, Gauss Seidel methods. [6 Hrs.]

Unit 2: Interpolation: Finite difference, Newton's forward and backward interpolation formulae, Central Difference formulae – Gauss forward and backward difference formulae, Newton's divided difference Formula, Lagrange's interpolation formula. [6 Hrs.]

Unit 3: Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule Ordinary Differential Equations - Euler's Method, Midpoint method, Runge Kutta Method. [5 Hrs.]

Unit 4: Regression Analysis: Regression analysis and its Assumptions, Simple linear regression model – least square method, Polynomial regression. [3 Hrs.]

Text Books/Reference Books:

- 1 Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- 2 Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- 3 Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, 2004.

Digital Reference:

- 1 <http://www.academicearth.org/>
- 2 <http://videolectures.net>

Title of the subject: Object Oriented Programming Using C++(Lab)

Course Code: MCA126

Teaching Scheme:

Practical: 2 hrs/week

Credits: 1

Examination Scheme:

Practical Exam: 50 Marks

Suggested List of Experiments:

- 1 Program based on C++ basics (Decisions and loops, Array etc.)
- 2 Program based on Class and Objects (Array of objects, Static class members, Passing and returning objects)
- 3 Program based on Function (Friend function, Function overloading, Default arguments, Inline function)
- 4 Program based on Constructor and Destructor
- 5 Program based on Pointers (this pointer, new and delete operator etc.)
- 6 Program based on Operator Overloading, Data conversion (Unary and Binary)
- 7 Program based on Inheritance (Different types of inheritance, Virtual base class, Containership)
- 8 Program based on Polymorphism (Virtual function, Abstract class etc.)
- 9 Program based on File I/O and Command Line Arguments
- 10 Program based on Exception handling and templates

Note: Minimum 3 programs from above list should be carried out preferably on open source platform.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

**Title of the subject: Operating System
Course Code: MCA 127**

**Teaching Scheme:
Practical: 2 hrs/week
Credits: 01**

**Examination Scheme:
Term work: 50 Marks**

Suggested topics to conduct practices in Linux/ Unix

- 1 System Access: Logging In, Linux Commands, Getting Help, Obtaining Information about Your System, Logging In and Using Remote Linux Systems.
- 2 Starting and Stopping Linux: Shutting Down a Linux System, Booting a Linux System, Other Boot Methods.
- 3 User Accounts: Creating Additional User Accounts, Groups, Managing Users and Groups.
- 4 File system: File system Navigation, Managing the File system, Performing File system Maintenance, Locating Files.
- 5 Working with Linux Permissions: Understanding Permissions, Changing File and Directory Permissions, Changing Default Permissions and Ownership, Setting Daemon and Process Permissions, Evaluating System Security.
- 6 Creating and Viewing Files: Using the vi Editor, Using Other Editors, Examining File Contents Redirection.
- 7 Archiving Files: Archiving Files with tar, Archiving Files with cpio, Archiving Files with Other Utilities, Zipping Files, Examining Backup Issues.
- 8 Shell Scripts: Creating a Shell Scripts (Create at least ten shell scripts).

- 9 Configuring the Linux Environment: Examining Shells, Using Variables, Examining Linux Configuration Script Files, Examining System Startup Files, Examining the /etc/fstab File,
- 10 Multitasking: Managing Jobs and Background Processes, Using the Process Table to Manage Processes, Delayed and Detached Jobs.

TERM WORK: Term work shall consist of minimum of 10 Assignments to be developed based on the above syllabus. The assessment on the term work shall be done on the following criteria:

- 1 Continuous assessment.
- 2 Performing the Experiment in the Lab.
- 3 Oral examination on the syllabus and the term work, mentioned above.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Reference Books:

- 1 Das, Unix: Concepts and Applications (4th Ed), TMH, 2006.
 - 2 Foster Johnson, Welch, Anderson, Beginning Shell Scripting, Wiley India (Wrox), 2006.
 - 3 Maurice J. Bach, The Design of the Unix Operating System, Pearson Education.
 - 4 <http://www.tutorialspoint.com/unix/>
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Title of the subject: Data Structures Using C
Course Code: MCA128

Teaching Scheme:
Practical: 2 hrs/week
Credits: 01

Examination Scheme:
Practical Exam: 50 Marks

Suggested List of Experiments:

- 1 Write a program to demonstrate insertion, deletion, search and displaying of an element in an array.
- 2 Write a program to demonstrate operations performed on stack.
- 3 Write a program to demonstrate operations on queue.
- 4 Write a program to demonstrate operations on singly link list.
- 5 Write a program to implement singly link list as a stack.
- 6 Write a program to implement operations on double link list.
- 7 Write a program to demonstrate creation, traversing and searching in Binary Search Tree.
- 8 Program to convert infix expression to postfix and infix to postfix.
- 9 Write a program to traverse a graph using DFS with an adjacency matrix.
- 10 Write a program to traverse a graph using BFS with an adjacency matrix.
- 11 Write a program to demonstrate sorting algorithm.(using any one of these techniques: bubble, Insertion, selection)

TERM WORK: Term work shall consist of minimum of 10 programs/Assignments to be developed based on the above syllabus .The assessment on the term work shall be done on the following criteria:

- 1 Continuous assessment.
- 2 Performing the Experiment in the Lab.
- 3 Oral examination on the syllabus and the term work, mentioned above.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Title of the subject: PHP and MYSQL Lab.

Course Code: MCA129

Teaching Scheme:

Practical: 2 hrs/week

Credits : 1

Examination Scheme:

Practical Exam: 50 Marks

Termwork:50 Marks

Course Objective:

- To understand server side programming
- To understand fundamentals concepts for developing dynamic web pages
- To design and use databases objects
- To design and develop dynamic web applications

Course Outcomes:

- Students will be able to:
- Understand and analyze the fundamental concepts of PHP language
- Build dynamic web pages using PHP (server side scripting)
- Implement core concepts of database management systems in MYSQL.
- Create dynamic, interactive and database-driven web applications as a part of mini-project, individually or in a team.

Course Prerequisite:

- Understanding of client side scripting, internet technologies and basic computer programming languages.
- Introduction to PHP: Introduction to server side programming, Client/Server Architecture, variables and constants, data types, operators and expressions, control structures and loops, arrays, string handling and functions.
- Form handling and state management: Creating dynamic web pages, GET and POST, Form Validations, File uploading, hidden fields, writing Query String, Cookies and Sessions.
- MYSQL: Introduction to MYSQL, creating databases, tables, constraints, executing DDL, DML and TCL commands, Group functions, Joins. Importing and exporting CSV data.
- PHP Database Connectivity with MYSQL: Connection with MYSQL, performing database operations (Insert, delete, update and select), Creating sample project.

TERM WORK: Term work shall consist of minimum of 10 programs/Assignments to be developed based on the above syllabus .The assessment on the term work shall be done on the following criteria:

- 1 Continuous assessment.
- 2 Performing the Experiment in the Lab.
- 3 Oral examination on the syllabus and the term work, mentioned above.
- 4 50% weightages should be given for mini project in termwork and external practical examination.

PRACTICAL EXAMINATION: The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments and mini project submitted by the candidate.

Mini Project: Guidelines for Mini Project:

- 1 Allow minimum 1 to maximum 2 students per mini project group
- 2 Take the topic from students in first 15 days from the start of the semester.
- 3 The report of this mini project is to be submitted in typed form with Spiral Binding.
- 4 The report should have all the necessary diagrams, charts and printouts.

Text Books/Reference Books :

- 1 PHP: The Complete Reference – Steven Holzner, McGraw Hill Education Private Ltd,2007
- 2 Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML Black Book by Kogent Learning Solutions Inc.
- 3 PHP and MYSQL – Mike McGrath, McGraw Hill Education Private Ltd,2012
- 4 MYSQL: The Complete Reference – Vikram Vaswani, McGraw Hill Education Private Ltd,2004

Digital References:

- 1 www.w3schools.com
- 2 www.tutorialspoint.com