



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

First Year MCA :

Trimester III

Subject Code: MCA 131

Subject Name: Fundamentals of Operating Systems

Lectures per week (hours) : 3 Lectures + 1 Tutorial

Practicals per week (hours) :

Internal Assessment : 50 Marks

External Assessment : 50 Theory Marks

Total Credits : 4

Prerequisite: Basic knowledge of Computer System peripherals and its functionality.

Aim:

The course is aimed to provide fundamental knowledge about Operating of various components of Computer System.

Objectives:

- (1) To understand the concept, structure and mechanism of Operating Systems.
- (2) To understand the complex interaction among various parts of systems.
- (3) To make students familiar with multi-user and multitasking Operating System.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Computer System Overview Basic Elements, Processor Register, Instruction Execution, Interrupt and Interrupt Processing, Memory Hierarchy, Cache Memory Operating System Overview Operating System Objective, OS as User/Computer Interface and Resource Manager, Evolution of OS – Serial, Simple Batch and Multiprogrammed Batch Systems, Time Sharing, Levels of OS Process Description Process and Process States, Two State Process Model, Creation and Termination of Process, Five State Process Model and Suspended Process	9	12
Unit II	Process Control OS Control Structure, Process Control Structure, Modes of Execution and Process Switching Threads & SMP Process & Thread, Multithreading and Thread Functionality, SMP Architecture and Organization and Overview of Microkernel Fundamentals of Concurrency Principles of Concurrency, Race Condition, Process interaction, Competition among Process for Resources	9	13



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Unit III	Concurrency: Mutual Exclusion & Synchronization Requirement of Mutual Exclusion, Semaphore, Producer / Consumer problem using Semaphore, Barbershop problem – An Unfair Barbershop and Fair Barbershop, Overview of Message passing Reader/Writer problem	9	12
Unit IV	Concurrency: Deadlock and Starvation Principle of Deadlock, Types of Resources, Resource Allocation Graph, Conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance and Detection, Dining Philosopher problem File System File Concept, Access Methods, Directory and Disk Structure, Overview of File Mounting, Sharing and Protection	9	13
	Total	36	50

Outcomes:

Upon the completion of this course, the students will be able:

1. To know the Computer System Operating platform.
2. Functional and Control units of Operating System.
3. Familiarize with Concurrency Mechanism

Reference Books:

- (1) Operating Systems: Internals and Design Principles, William Stallings, Pearson, 6th Edition.
- (2) Operating System Concepts, Silberschatz, Galvin, Gagne, Wiley-India, 8th Edition

Additional Reference Books:

- (1) Operating Systems Design and Implementation, Andrew Tananbaum, Pearson Education, 4th Edition
- (2) Operating Systems Concepts and Design, Milan Milenkovic, Tata McGraw-Hill, 2nd Edition.



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

First Year MCA :

Trimester III

Subject Code: MCA 132 **Subject Name:** Object Oriented Concepts and Programming with C++

Lectures per week (hours) : 3 Lectures + 1 Tutorial
Practical per week (hours) : 4 Practical
Internal Assessment : 50 Marks
External Assessment : 50 Theory + 50 Practical Marks
Total Credits : 8

Prerequisite: Programming using C and C++ (Trimester II subject)

Aim

To learning object-oriented concepts and their applications using C++ programming language

Objectives

- Differentiate between procedural programming approach and object-oriented programming (OOP) approach and the advantages of OOP approach to real-life software application development.
- Learn object-oriented concepts and their application using C++ language to develop efficient and maintainable solutions to various programming problems.
- Learn ANSI C++ language and its various features.
- To provide a strong foundation to the students for learning modern day object-oriented technologies like JAVA, .NET and PHP.

Course Contents:

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to Classes, objects, static members, Constructors and Destructors Classes and objects, Memory allocation for objects, Static-members of class, static data-members and static methods, array of objects, const member functions, Constructors and their use, Multiple constructors in a class, parameterized constructors, constructors with default arguments, constructing two-dimensional arrays, constant objects, dynamic initialization, dynamic memory allocation, copy constructors, member initialization list, destructors.	9	12
Unit II	Operator overloading Friend functions, function with object as arguments, defining operator overloading, process of overloading, overloading unary operators, overloading binary operators and their usage, overloading binary operators using friend functions, manipulation of strings using operators (brief idea of inbuilt ANSI C++ string class	9	12



and its overloaded operators), rules for overloading operators, user defined conversions: basic to class type, class to basic type, one class to another class type, using friends functions for operator overloading

Templates

Introduction to generic programming and software reusability, its advantages, types of templates: function template and class template, single argument function templates, instantiation, function templates with multiple arguments, function templates with two generic arguments and non-generic arguments, template argument deduction, explicitly specializing a template function, overloading a generic function with another generic function, class templates, defining functions of class template outside class, class instantiation, using non-type arguments in template class, using default arguments in template class.

Unit III **Inheritance**

9 13

Advantages of inheritance, implementation of inheritance in C++ object model, Types of inheritance, use of protected access specifier in inheritance, public, private and protected modes of inheritance, defining a derived class from a single base class using public modifier, deriving multiple classes from single base class and its example, multiple inheritance with example, drawbacks of multiple inheritance, virtual base class and why it is required, abstract class, rules of constructors and destructors in inheritances, composite (container) objects

Runtime polymorphism using Virtual Functions

Polymorphism, different types and its importance, difference between compile-time and run-time polymorphism, pointer to objects, array of pointers to objects, this pointer, virtual functions and achieving runtime polymorphism, virtual destructors, pure virtual functions.

Unit IV **IO streams and formatted IO**

9 13

Predefined Streams, advantages of using C++ IO over C I/O, new features in ANSI C++ IO, hierarchy of C++ stream classes, formatted and unformatted I/O, put and get member functions, using getline, read and write functions with their programs, using formatting flags in ios class, setting and clearing format flags, using setf function with two arguments, manipulators, differences between manipulators and ios functions, using manipulators for toggle effect, short hand manipulators, creating your own manipulator, usage of custom manipulator with a report printing program



2.0	Operator overloading	09
	Friend functions, function with object as arguments, overloading unary operators, overloading binary operators and their usage, overloading binary operators using friend functions, manipulation of strings using operators user defined conversions: basic to class type, class to basic type, one class to another class type, using friends functions for operator overloading	
	Templates	
	function template and class template, single argument function templates, instantiation, example of generic sorting and need for operator overloading, example of sorting employee objects using generic bubble sort, function templates with multiple arguments, function templates with two generic arguments and non-generic arguments, template argument deduction, explicitly specializing a template function, overloading a generic function with another generic function, class templates, defining functions of class template outside class, class instantiation, using non-type arguments in template class, using default arguments in template class.	
3.0	Inheritance	09
	Types of inheritance, use of protected access specifier in inheritance, public, private and protected modes of inheritance, defining a derived class from a single base class using public modifier, deriving multiple classes from single base class and its example, multiple inheritance with example, virtual base class, abstract class, rules of constructors and destructors in inheritances, composite (container) objects	
	Runtime polymorphism using Virtual Functions	
	Polymorphism, different types and its importance, difference between compile-time and run-time polymorphism, pointer to objects, array of pointers to objects, this pointer, virtual functions and achieving runtime polymorphism, virtual destructors, pure virtual functions.	
4.0	IO Streams, Using files for IO and namespaces	09
	Using Streams for formatting I/O, manipulators, creating your own manipulator, text and binary streams, dealing with text and binary files, random access using seek.	
	Defining namespaces, nested namespaces, using std namespace.	
	Total	36



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

First Year MCA :

Trimester III

Subject Code: MCA 133

Subject: System Software

Lectures per week (hours)

: 3 Lectures + 1 Tutorial

Practicals per week (hours)

: 4

Internal Assessment

: 50 Marks

External Assessment

: 50 Theory + 50 Practical Marks

Total Credits

: 8

Prerequisite:

The basic knowledge of business data processing and logical organization of computers are required.

Aim:

The course is aimed to understand design and implementation of various types of system software.

Objectives:

- (1) To study the relationship between machine architecture and system software
- (2) To study various kind of system softwares like assembler, macro processor compiler and interpreter.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Language Processor Introduction – language processing activity – fundamentals of language processing – fundamentals of language specification Scanning and Parsing Scanning (Introduction to finite state automata – regular expression – building DFAs) – Parsing (Parse tree – abstract syntax tree – top down parsing – bottom up parsing).	8	12
Unit II	Assemblers Elements of Assembly language programming – symbol table – mnemonics table – pass structure of assembler (pass I and pass II) – assembler directives.	8	10
Unit III	Macro and Macro Processors: Macro definition and call – macro expansion – nested macro calls - advanced macro facilities - design of macro processor	7	12



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Unit IV	Compiler and Interpreters	13	16
	Aspects of compilation – memory allocation – compilation of expressions – compilation of control structures – code optimization – interpreters.		
	Linker		
	Translated, linked and load time addresses, Relocation and Linking Concepts, Self Relocating Programs		
	Loaders		
	Binary Image – Types of Loaders		
	Total	36	50

Outcomes:

Upon the completion of this course, the student will be able to:

- (1) Understand the relationship between machine architecture and system softwares
- (2) Implement scanner, parser, assembler, and macro processor practically.

Reference Books:

- (1) Systems Programming and Operating Systems by D.M. Dhamdhere, Tata Mcgraw – Hill Publishing Company, 2nd Edition.
- (2) System Software by Santanu Chattopadhyay, PHI Private Ltd., 1st Edition.

Additional Reference Books:

- (1) Systems Programming by Donovan J.J., Tata Mcgraw – Hill Publishing Company, 1st Edition.
- (2) Compilers: Principles, Techniques and Tools by Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Pearson Education, 2nd Edition.

Subject Code: MCA 245

Subject Name: System Software

Practicals per week (hours) : 4

Total Marks (Practical Exam) : 50

Topics to be covered in Practical Sessions

Sr. No.	Topics to be covered	No. of Practicals
1.0	Introduction to Assembly Language	8
	1.1 Data Transfer Instructions	
	1.2 Arithmetical Instructions	
	1.3 String Instructions	
	1.4 Logical Instructions	
2.0	Scanning and Parsing	14
	2.1 Scanner	
	2.2 Parser	
3.0	Assemblers And Macro Processors	14
	3.1 Assembler Pass – I	
	3.2 Assembler Pass - II	
	Total	36



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Master of Computer Applications (M.C.A.)

First Year MCA :

Trimester III

Subject Code: MCA 134 **Subject:** Computer Oriented Numerical and Statistical Methods

Lectures per week (hours)	: 3 Lectures + 1 Tutorial
Practicals per week (hours)	: 2
Internal Assessment	: 50 Marks
External Assessment	: 50 Marks Theory + 50 Marks Practical
Total Credits	: 6

Prerequisite:

The basic concepts of trigonometric, logarithmic, exponential and arithmetic functions, polynomial and roots of a polynomial. The basic knowledge of statistics, measures of central tendency, measures of dispersion, correlation and regression.

Aim:

In the modern times, a comprehensive grasp of mathematics and statistics is absolutely necessary for the meaningful study of business problems as well as profit making decisions.. The aim of this course is to teach various quantitative and qualitative methods and tests which help students to select, interpret, analyze and present data.

Objectives:

- (1) To develop the concept of error in various methods
- (2) To explain, calculate and interpret inferential statistics including probability and hypothesis tests.
- (3) To identify and apply the correct statistical technique to the problem.
- (4) To predict the future values using different time series methods.
- (5) To analyze the variance amongst different sample data.
- (6) To identify connections between statistics and the real world.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Computer Arithmetic and Iterative Methods Definition of error – Types of errors in numerical analysis – Descartes’ rule of sign - Categories of iterative methods – Bisection method – False Position method – Newton Raphson method Probability and Expectation Basic Terminology – Conditional probability – Total Probability - Baye’s rule applications	9	12
Unit II	Random variable and Probability distribution Expectation .- Joint probability – Probability mass function – Binomial distribution – Poisson distribution- Normal distribution.	9	12



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Unit III	Statistical Inference Theory and Non – parametric tests Statistical Inference Theory: (overview of sampling) Type I and Type II error – One tail and Two tail tests – Large Sample z tests – Small sample t - tests Non – parametric tests: Chi square test – Applications of chi square test – Sign test – U test – H test – One sample run test.	9	14
Unit IV	Time Series and Analysis of Variance (ANOVA) Time Series: Definition – Components of Time series – Methods of finding trend (Semi average method – Moving average method, Least Square Method) – Method of finding seasonal variations (Method of simple average – Ratio to trend method) Analysis of Variance (ANOVA): Definition, Assumptions and uses of ANOVA – One way ANOVA – Two way ANOVA	9	12
	Total	36	50

Outcomes:

Upon the completion of this course, the student will be able to:

1. Efficiently list the sources of errors in computation
2. Identify correct statistical technique to the problem.
3. Effectively choose proper hypothesis and solve the problem
4. Apply the knowledge of various parametric and non – parametric tests to solve the real life applications.
5. Forecast values using proper time series method.

Reference Books:

- (1) Numerical Methods: Principles, Analyses and algorithms by Srimanta Pal, Oxford Higher Education, First Edition
- (2) Statistical Methods by S.P. Gupta, S. Chand Company Ltd., 1st Edition
- (3) Statistics for Management by R. Levin and D.S. Rubin, PHI Private Ltd., 7th Edition

Additional Reference Books:

- (1) Comprehensive Statistical Methods by P.N. Arora, Sumeet Arora, S. Arora, S. Chand Company Ltd., 2nd Edition.
- (2) Statistics for Managers Using Microsoft Excel by Levine, Stephan, Krehbiel, Berenson, PHI Private Ltd., 4th Edition.
- (3) Statistics: Theory, Methods and Application by D.C. Sancheti and V.K. Kapoor, S. Chand Company Ltd., 7th Edition.
- (4) Business Statistics by A.P. Verma, Asian Books Private Ltd., Third Edition.
- (5) Business Statistics – A Self Study by B. Jhunjhunwala, S. Chand Company Ltd., 1st Edition.



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Subject Code: MCA 134 **Subject Name:** Computer Oriented Numerical and Statistical Methods

Practicals per week (hours) : 2

Total Marks (Practical Exam) : 50

Topics to be covered in Practical Sessions

Sr. No.	Topics to be covered	No. of Practical
1.0	Iterative Methods*	6
	1.1 Bisection Method	
	1.2 False Position Method	
	1.3 Newton Raphson Method	
	Probability and Expectation	
	1.4 Conditional probability	
	1.5 Baye's Rule	
	1.6 Expectation	
2.0	Random variable and Probability distribution	4
	2.1 Binomial Distribution	
	2.2 Poisson Distribution	
	2.3 Geometric Distribution	
	2.4 Normal Distribution	
3.0	Statistical Inference Theory and Non – parametric tests	4
	3.1 Large Sample Tests	
	3.2 Small Sample Tests	
	3.3 Tests of Number of Successes and Difference between Proportion	
	3.4 Chi – Square Test, Sign Test, H – Test, U – Test One – Sample Run Test	
4.0	Time Series and Analysis of Variance (ANOVA)	4
	4.1 Moving average	
	4.2 Ratio to trend method	
	4.3 One way ANOVA	
	4.4 Two way ANOVA	
	Total	18

* Students will have to explore the above mentioned practical using MATLAB or C.



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Master of Computer Applications (M.C.A.)

First Year MCA :

Trimester III

Subject Code: MCA 135

Subject: Management Systems

Lectures per week (hours) : 3 Lectures + 1 Tutorial

Practicals per week (hours) : 0

Internal Assessment : 50 Marks

External Assessment : 50 Theory Marks

Total Credits : 4

Prerequisite: None

Aim:

The course is aimed to help the student understand and appreciate the basic concepts of Management Systems and importance of Management Systems for an organization.

Objectives:

To understand the basic concept of Management Systems

To understand the basic functioning of various departments in an organization.

To gain knowledge of basic financial and cost accounting systems and analysis and interpretation of financial statements.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to Business Systems and Management Information System. Functional departments in Non-Manufacturing Organizations Introduction – Definition – Evolution of modern day concept of MIS – MIS and other disciplines – Manual and automated manifestations – need, Purpose and objective of MIS – Conceptual, logical and physical depiction of MIS - Role and place of MIS in Business Org – Types of Business Org and relevance to MIS – Classification of Info Systems (TPS, MIS, EIS , OIS , DSS, ES) - TPS checks and controls – Functional departments in Nonmanufacturing organizations like Banks and Financial Institutions, Insurance Sector, Hospitality, Healthcare, Transportation etc.	7	10
Unit II	Functional departments in Manufacturing Organizations and their Functioning Functional departments like Manufacturing, Sales and Marketing, Materials, Research and Development, Finance and Accounting, Transportation and logistics, Share, Human Resources etc., their functioning and the MIS requirement in these departments.	9	15



Unit III	Introduction to Financial Accounting System	12	10
	Role of accounting system in an enterprise, accounting as in information system, its importance, basic transactions in business, difference between transactions and events (adjustments), cash and credit transactions, Internal and external users of accounting system, audit.		
	Accounting procedure (mechanics) and accounting books: Journal, Ledger and Trial balance, interpreting the results using P and L a/c and Balance sheet.		
	Journal and format of journal, recording the transactions in journal (only basic transactions of business), Types of transaction: Equity, liability, asset, purchase, sales, expense, income, examples of recording transaction in journal, division of journal.		
	Rules of financial accounting		
	Rules of personal, real and nominal accounts, Balance sheet equation based single rule of debit and credit (personal a/c, real a/c and nominal a/c), applying rules to seven transaction model		
	Ledger		
	Format of ledger, posting transactions from journal to ledger		
	Trial Balance		
	Preparing trial balance from ledger, use of trial balance, Errors affecting and not effecting trial balance		
	Preparation of Financial Statements		
	Basic concepts of accounting, format and purpose of Trading account, Profit and loss account, Balance sheet, adjustments or events, their effect on final accounts, examples of preparation of final accounts from trial balance.		
	Exposure to FAS Software		
	Basic understanding of FAS (like Tally 9) as an information system, features of Tally, Installation and configuration, creation of company, ledgers and ledger groups, voucher entry, types of voucher – payment, receipt, sales, purchase, journal and contra voucher, Examples of recording transactions in Tally, generation of Leger and Trial balance and its effect on Balance sheet, Reports – Trial balance, Day book, Balance sheet, Profit and Loss account and ratio analysis, examples of voucher entry and preparation of final accounts.		



Unit IV	Analysis and interpretation of financial statements using ratio analysis	08	15
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Introduction to ratios and their benefits to different stake holders in business, functional classification of ratio analysis, (only basic ratios to be covered) Liquidity ratios, Profitability ratios, Asset turnover ratios, Financial structure ratios, Duo pont chart (return on investment), examples of calculating different ratios from financial statements (P and L a/c and Balance sheet),

Introduction to Cost Accounting

Difference between financial accounting and cost accounting, advantages of cost accounting, different elements of cost (material, labor and expenses), classification into direct and indirect costs, overheads and classification of overheads, preparing cost sheet.

Introduction to Standard Costing

Difference between costing and standard costing, advantage of standard costing, variances and variance analysis, favorable and unfavorable variances, calculating material cost variance, labor cost variance and overhead variance and examples of standard costing to find difference variances.

Total		36	50
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Outcomes:

Upon the completion of this course, the student will be able to:

Understand and appreciate the basic concepts of Management Systems.

Understand and appreciate the basic functioning of various departments in manufacturing and no manufacturing organizations.

Understand and appreciate the importance of Financial and cost accounting and able to contribute effectively in the development of such systems.

Reference Books:

1. Textbook of Financial Cost and Management accounting, P Periasamy, Himalaya Publishing House, 3rd Edition, 2008.
2. Financial Accounting for Business Managers, Asish K Bhattacharyya, PHI, 3rd Edition, 2008.
3. Management Information Systems, Dr Milind Oka, Everest Publishing House, 16th Edition, 2009

Additional Reference Books:

1. Management Information Systems Managing the Digital Firm, Laudon and Laudon, Pearson Education, 11th Edition
2. Information Systems for Modern Management. Robert G. Murdick, Joel E. Ross, James R. Claggett. PHI, 3rd Edition
3. Financial Accounting, R. Narayanaswamy, PHI, 4th Edition, 2008.



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AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

If You Can

*If you can keep your head when all about you
Are losing theirs and blaming it on you,
If you can trust yourself when all men doubt you,
But make allowance for their doubting too;
If you can wait and not be tired by waiting,
Or being lied about, don't deal in lies,
Or being hated, don't give way to hating,
And yet don't look too good, nor talk too wise:
If you can dream and not make dreams your master;
If you can think - and not make thoughts your aim;
If you can meet with Triumph and Disaster
And treat these two impostors just the same;
If you can bear to hear the truth you've spoken
Twisted by knaves to make a trap for fools,
Or watch the things you gave your life to, broken,
And stoop and build 'em up with worn-out tools:
If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: 'Hold on!'
If you can talk with crowds and keep your virtue,
Or walk with Kings - nor lose the common touch,
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;
If you can fill the unforgiving minute
With sixty seconds' worth of distance run,
Yours is the Earth and everything that's in it,
And - which is more - you'll be a Man, my son!*

"The great aim of education is not knowledge but action."