



Subject Name	L	T	P	Credits
Operating System & Its Applications	2	1	4	5

### Course Objectives:

- To help students become familiar with the fundamental concepts of operating systems.
- To Process synchronization and Interprocess communication.
- To Learn Memory Management.
- To learn Disk Scheduling and File management.
- To understand Distributed Operating System.

### Unit-I

**Introduction-** Basics of Operating Systems: Definition, Generations of Operating systems, Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel, System calls, Logical view, User view, Concept of virtual machine. **Process management and CPU scheduling-** Definition , Process Relationship , Process states , Process State transitions , Process Control Block ,Context switching, Threads, Concept of multithreads, Types of threads, Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria , Scheduling algorithms.

### Unit-II

**Process synchronization and Interprocess communication-** Synchronization concept, Synchronization Requirement Critical Section Problem, Classical problem of synchronization, Semaphores, Race Conditions and Classical IPC Problems: The producer-consumer problem, Reader's & Writer Problem, Dining Philosopher Problem etc. **Deadlock-** Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.

### Unit-III

**Memory Management-** Concept, Memory Management Techniques, Contiguous & Non-Contiguous allocation, Logical & Physical Memory, Swapping, Conversion of Logical to Physical address, Paging, Segmentation Segment with paging, Virtual Memory Concept, Demand paging, Page Replacement algorithm, Allocation of Frames, Page fault, Demand paging, Thrashing.

### Unit-IV

**Disk Scheduling and File management-** Disk Structures, Disk Scheduling algorithms, File Systems Interface-File concepts, Access methods, Directory structures, File System Implementation, File Systems structures, Directory Implementation, Allocation, Free Space management. **I/O management-** Principles of I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software, Goals of Interrupt handlers, Device drivers, Device independent I/O software.

### Unit-V



**Distributed Operating System-** Difference Between Distributed & Centralized OS, Advantages of Distributed OS, Types of Distributed OS, Concept of Global OS, Features of Different OS, Integration of OS. **Security and Protection-** Security Environment, Design Principles of Security, User Authentication, Protection Mechanism: Protection Domain, Access Control List.

### **Books:**

1. Abraham Silberschalz Peter B Galvin, G.Gagne, "Operating Systems Concepts", Seventh Edition, AddisonWesley Publishing Co.,2010
2. Andrew S.Tanenbaum, "Modern operating Systems", Third Edition, PHI Learning Pvt.Ltd., 2008
3. William Stallings, "Operating Systems: Internals and Design Principles",Seventh Edition, Prentice Hall, 2011.
4. H M Deital, P J Deital and D R Choffnes, "Operating Systems" ,3rd edition, Pearson Education,2011.
5. D M Dhamdhere, "Operating Systems: A Concept-based Approach", Second Edition, Tata McGraw-Hill Education, 2007.

### **Course Outcomes:**

- Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
- Understand the difference between process & thread, issues of scheduling of userlevel processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
- Gain knowledge about the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
- Demonstrate the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
- Understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.



Subject Name	L	T	P	Credits
Object Oriented Programming using C++	2	1	4	5

### Course Objectives:

- To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.
- To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity.
- To enhance problem solving and programming skills in C++ with extensive programming projects

### Unit I

Evolution of programming methodologies, Procedural Approach Vs Object-Oriented Approach. Principles of OOP: Encapsulation and Abstraction, Message Passing, Inheritance – Reusability, Extensibility, Polymorphism – Overloading, Dynamic Binding. Limitations of C, Introduction to C++, Structure of the C++ program, Added features of C++ over C – Storage Classes, Reference variables, Inline functions. Simple I/O using cin & cout, I/O formatting and I/O functions. Name spaces, and volatile functions. Introduction to Objects and Classes, Defining the class, Defining Data members and member functions, Creating Objects of Class, Access Specifiers – private, public and protected. Scope Resolution operator, Friend Functions and Friend Classes – Static Members. this pointer, returning values using this pointer. Comparison of class with structure.

### Unit II

**Constructors and Destructors:** Purpose of Constructors and Destructors, Default Constructors, Constructors with & without parameters, Constructor Overloading, Copy Constructor. Invoking Constructors and Destructors.

**Pointers in C++ :** Pointer declaration and Access, Pointer to void, pointer and arrays, pointer to pointer, pointer to functions, call by pointer, pointer arrays, Jagged array, array of pointers to string, pointer sort, memory management – new and delete, pointer to object – referencing members using pointers, self referencing class, wild pointers.

### Unit III

**Polymorphism:** Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters. Operator Overloading: Defining Operator Function, Rules for overloading Operators. Overloading unary operators, overloading binary operators, Overloading Comma, [], (), ->, new, delete Operators. Type Conversions : Basic to Class, Class to Basic and one Class to another Class type. Advanced Type Casting.

### Unit IV

**Inheritance :** Basic Concepts, Reusability & Extensibility. Defining derived classes, protected access specifier in Base class – public, private & protected inheritance – constructors and destructors in derived classes – Types of Inheritances. Virtual base class.

**Virtual Functions** : Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes.

## Unit V

**Console I/O operations** : C++ streams and C++ stream classes – Predefined Objects, unformatted I/O operations, Formatted I/O operations - manipulators - User defined manipulators - Overloading << and >> Operators for Objects.

**Disk I/O Operations** : Stream Classes, classes for file stream operations, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple objects, file pointer specifying the position, tellg() and seekg(), seekp() and tellp().

**Templates:** Generic Functions- A generic swap function, Functions with more than one Generic Type, Overloading a Function Template. Generic Classes – A stack generic class, Class template with more than one Generic Type, typename and template keywords, Template Restrictions, The power of Templates.

**Exception Handling** : Fundamentals of Exception Handling, Catching Class Types, Using Multiple catch statements, Catching All Exception, Restricting Exception, throw statement, Setting the Terminate and Unexpected Handlers, Uncaught exception, bad exception Classes, and Built-In Exceptions. Exception Vs Error Handling, Assertion in C++.

## Books:

1. Deitel & Deitel, C++ How to program, Pearson Education Asia, 3rd Edition, 2001
2. Schildt Herbert, The Complete Reference C++, Tata McGraw Hill, 4th Edition, 2003
3. Lafore, Robert, Object Oriented Programming in Turbo C++, Galgotia Publications Pvt. Ltd, 2000.
4. E Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, 2 nd Edition.
5. Gaddis Tony, Starting Out with C++, dreamtech Press, 3rd Edition, 2002.
6. Sotter A Nicholas and Kleper J Scott, Professional C++, Wiley Publishing Inc.

## Course Outcomes:

- Gain the basic knowledge on Object Oriented concepts.
- Ability to develop applications using Object Oriented Programming Concepts
- To demonstrate the differences between traditional imperative design and object-oriented Design To explain class structures as fundamental, modular building blocks
- To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code
- To write small/medium scale C++ programs with simple graphical user interface  
Understand the file handling and error handling mechanisms in C++



Subject Name	L	T	P	Credits
Database Management System	2	1	4	5

## Course Objectives:

- To learn fundamentals of database architecture, database management systems, and database systems.
- To learn Basic and Advanced SQL queries.
- To understand about Relational Model.
- To learn and understand about Distributed Databases.
- To learn and understand Transaction & Concurrency Control

## Unit-I

**Introduction:** Purpose of Database System, History of Database Systems, Data Models, Database Languages, Transaction Management, Storage Management, Data Dictionary, Database Users, Database Administrator, Architecture of a DBMS, Database Design and Entity - Relational Model: Overview of design process, E-R model, E – R Diagram.

## Unit-II

**SQL & Advanced SQL:** Data definition, Basic structure of SQL queries, Selection Operation ,Set Operations, Aggregate Functions, Null Values, Nested Sub Queries,views, modification of database, SQL data types & schemas, Keys, Constraints , Integrity constraints, authorization, Embedded SQL.

## Unit-III

**Relational Model:** Structure of Relational Database, Fundamental Relational Algebra Operations, Additional Relational Algebra Operations, Domain Relational Calculus, Tuple Relational calculus. Normalisation: Functional Dependencies, multivalued dependencies, theory of normalization, normal forms.

## Unit-IV

**DISTRIBUTED DATABASES :** Basic idea, distributed data storage, Data replication, Data Fragmentation, horizontal, vertical & mixed fragmentation. **EMERGING TRENDS IN DBMS :-** Object – Oriented database- Basic idea & the model Object structures Object, Class, inheritance, multiple object identity, Data warehousing terminology, definitions, characteristics, Data mining & its overview, Database on www.

## Unit-V

**Transaction & Concurrency Control:** Transaction Concepts & ACID Properties, Transaction States, Concurrent Executions, Serializability & Its Testing, Recoverability, Introduction to Concurrency Control, Locked Base Protocol & Deadlock Handling. **Case Studies:** PostgreSQL – Oracle – IBM DB2 Universal Database – My SQL – Microsoft SQL Server.



## Reference Books:

1. A.Silberschatz et.al - Database System Concepts, 5th Edn, Tata Mc-Graw Hill, New Delhi-2000.
2. Henry F.Korth & A. Silbershatz: Data System Concepts. Mc-GrawHill.
3. Date C.J.- An Introduction to Database System, Pearson Education, New Delhi- 2005
4. R. Elmasri, Fundamentals of Database Systems, Pearson Education, New Delhi, 2005.
5. Bipin C.Desai: An Introduction to Database Systems, West-publishing company.

## Course Outcomes:

- To analyze Data Base design methodology.
- Acquire knowledge in fundamentals of Data Base Management System.
- Be able to analyze the difference between traditional file system and DBMS.
- Able to handle with different Data Base languages.
- Draw various data models for Data Base and Write queries.



Subject Name	L	T	P	Credits
Numerical Methods	3	1	-	4

### Course Objectives:

- Provide basic understanding of the derivation and the use of the numerical methods.
- Knowledge of finite precision arithmetic and fundamental concepts of statistics.
- Knowledge of Simultaneous linear equations.
- To learn about Distributions.
- To understand Hypothesis testing for sampling.

### Unit-I

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating point arithmetic, normalized floating point numbers, Round off and truncation errors, relative and absolute errors. Iterative methods: Zeros of single transcendental equations and zeros of polynomials using bisections, false position, Newton Raphson methods. Convergence of solutions.

### Unit-II

Interpolation: Forward, Backward, central (Striplings) and divided difference formulas, Lagrange's interpolation, Inverse interpolation for equal and unequal intervals. Numerical Integration: Newton Cote's formula, Simpson's 1/3rd and 3/8th rule. Gauss Legendre (two and three points) integration formula.

### Unit-III

Simultaneous linear equations: Solutions of simultaneous linear equations – Gauss elimination method and pivoting, ill conditioned equations and refinement of solutions, Gauss-seidal iterative methods. Solution of differential equation: Runge-Kutta fourth order method. Euler's method, Picard's method, Taylor's series method.

### Unit-IV

Distributions: Binomial distribution, Poisson distribution and normal distribution,  $\chi^2$  distribution, Rectangular distribution, hypergeometric distribution.

### Unit-V

Hypothesis testing for sampling: Small samples, t, z and f tests. Chi-square test. Large samples: Comparison of large samples, testing the significance of the difference between the means of two large samples.

### Books:

1. E. Balaguruswamy "Numerical Methods" , TMH, ISBN – 07-463311-2, 1999.
2. B. S. Grewal "Numerical Methods in Engineering & Science".
3. Miller "Mathematical Statistics with applications" 7 ed, Pearson.
4. Gupta & Kapoor, Introduction to Statistics, Chand & Co.
5. V. Rajaraman, "Computer Oriented Numerical Methods".



6. M. Ray and Har Swarup Sharma, "Mathematical Statistics".
7. Iyenger M. K. Jain & R. K. Jain, "Numerical Methods for scientific and engineering computation", Wiley Eastern (New Age), 1995.

### **Course Outcomes:**

- Students will get acquainted with the different numerical methods used in problem solving.
- Students will develop logical understanding through the concepts learned in the class, which is the base of computer science.
- Students will get acquainted with essential ideas and reasoning of applied statistics like data analysis, distributions and inference theory.
- Students will learn a statistical techniques through different tools and apply it to case studies using the concepts learned in the class.





Subject Name	L	T	P	Credits
Business Foundations	3	1	2	5

### Course Objectives:

- Learning basics of marketing.
- Learning financial accounting.
- To Learn Operation Management.
- To Learn Personnel Management.
- Learn about elements of entrepreneurship.

### Unit-I

Marketing Basics: Meaning, nature and scope of marketing. Marketing segmentation, targeting and positioning. Concept of marketing mix – Product, price, place & promotion.

### Unit-II

Introduction to Financial accounting: Meaning, nature and concept of accounting. Rule of debit and credit. Trading, P&L, and balance sheet. Financial analysis and reporting.

### Unit-III

Operation Management: Meaning, nature & scope of operation management. Relationship with other functional areas. Just in time approach of operation management. New product design and process.

### Unit-IV

Personnel Management: Meaning, scope and concept of personnel management. Role of Personnel manager in organization. Human resource planning.

### Unit-V

Entrepreneurship: Meaning, elements, determinants and importance of entrepreneurship. Mobilizing resources for start-ups & basic start up problems.

### Books:

1. Desai, Vasant. Dynamics of Entrepreneurial Development and Management. Mumbai, Himalaya Publishing House.
2. Kuratko and Rao, Entrepreneurship: A South Asian Perspective, Cengage Learning.
3. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ehsanul Haque. Principles of Marketing. 13th edition. Pearson Education.
4. Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. Marketing:



Concepts and Cases. (Special Indian Edition)., McGraw Hill Education

5. S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
6. Tulsian, P.C. Financial Accounting, Pearson Education Ivancevich, John M. Human Resource Management. McGraw Hill.
7. Wreather and Davis. Human Resource Management. Pearson Education.
8. Production and Operations Management, by K. Aswathappa and K Shridhara Bhat, HPH
9. Production and Operation Management, Evercctt Adam Jy. Ronald, Ebert, PHI

### **Course Outcomes:**

- Student will gain knowledge about concepts of marketing.
- Student will know about rules of financial accounting.
- Will be able to understand operation management.
- Will gain knowledge about personnel management and Human resource planning.
- Able to understand Entrepreneurship and startups.