- Introduction to User Datagram Protocol (UDP)

4. Domain Name Systems, Electronic Mail and World Wide Web

- The DNS Name Space, Resource records, Name servers
- Electronic mail: architecture and services
- Introduction to World Wide Web, Uniform Resource Locator and Cookies

MAIN REFERENCE BOOKS:

1. Tanenbaum A. S.: Computer Networks, Prentice-Hall of India Pvt. Ltd., New Delhi, 2002.
2. Forouzan B. A.: Data Communications and Networking, 3rd Edition, Tata McGraw-Hill, 2004.

BOOKS FOR ADDITIONAL READING:

1. Stallings W.: Data and Computer Communications, 6rd Edition, Macmillan Pub. Company, New York, 1999.

DATA STRUCTURES & ADVANCED PROGRAMMING CONCEPTS

COURSE NO: PS02CMCA22

(3 Lectures & 1 Seminar/Tutorial per week Total Marks: 100)

COURSE CONTENT:

1. Introduction to Data Structures

- Time and space efficiency of algorithms
- Primitive and Composite data types
- Arrays
- Stacks
- Queues and its types
- Linked Lists and its types

2. Randomization & File Management

- Binary Trees and its representations
- Inverted lists, Multi-lists
- Concepts of fields, records and files
- Variable length records
- Hashing techniques for direct files
- Sequential file organization
- Indexed Sequential Access Method (ISAM)
- B trees and B+ trees

3. Object Oriented Programming Systems

- Introduction to Object Oriented Programming (OOP), Advantages of OOP
- Differences between conventional and object oriented languages
- An anatomy of C++ Program
- Classes and Objects and instantiation, data members, methods
- Constructors, Destructors, new and delete operators
- Basic input/output
- Inheritance and different types of inheritance
- Abstraction and encapsulation

4. Object Oriented Programming

- Access controls
- Input/output in detail

- Polymorphism, function and operator overloading
- Virtual functions
- Exception handling
- Templates, An example of use of Standard Template Library (STL)
- Introduction to namespace

MAIN REFERENCE BOOKS :

1. Tremblay J. & Sorenson P. G. : An Introduction to Data Structures with Applications, 2nd Edition, McGraw-Hill International Edition, 1987.
2. Singh Bhagat & Naps Thomas : Introduction to Data Structures, Tata McGraw-Hill Publishing Co. Ltd.,1985.
3. Lippman, Lajoie & Moo : C++ Primer, Fourth Edition, Addison Wesley, 2005
4. Deitel & Deitel : Java How to program, Eighth Edition, PHI Learning Private Ltd., 2010

BOOKS FOR ADDITIONAL READING :

1. Langran Yedidyah, Augeustem Moshe J, Tenenbaum Aron M., Data Structures Using C and C++, PHI, 1999.
2. Stroustrup, Bjarne : The C++ Programming Language, Special Edition, Parson Education Asia, 2001
3. Liberty Jesse & Keogh Jim, C++ - An Introduction to Programming, Prentice Hall India Ltd., 2001
4. Hubbard J. R., Schaum's Outlines Programming with C++, Tata McGraw-Hill Publishing Co. Ltd., 2006

DATABASE MANAGEMENT SYSTEMS - II

COURSE NO: PS02CMCA23

(3 Lectures & 1 Seminar/Tutorial per week Total Marks: 100)

COURSE CONTENT:

1. Important Concepts in Database Management

- Important conceptual data models: hierarchical, network, relational, object-oriented, object-relational, nested relational models
- Overview of data warehousing and data mining
- Introduction to different application architectures
- Transaction processing
- Concurrent processing
- Introduction to database administration, security, backup, recovery
- Introduction to Indexes, performance tuning and optimization

2. Relational Database Query, Modeling and Design Theory

- The Enhanced Entity-Relationship (EER) model: inheritance, superclasses, subclasses, specialization, generalization, class hierarchies, unions, class lattices
- Relational algebra, relational calculus
- Goals and pitfalls of database design
- Normalization (1NF to BCNF, awareness of 4NF, 5NF/PJNF, other normal forms), denormalization
- Practical case studies of database design

3. Database Programming - I

- Procedural extensions to SQL
- Data types, syntax, control structures
- Error handling
- Cursors

4. Database Programming - II

- Stored procedures and functions
- Database triggers
- Packages / libraries
- Introduction to using Nested Relational databases

- Introduction to using Object Relational databases
- Materialized views, regular expressions, hierarchical queries

MAIN REFERENCE BOOKS :

1. Elmasri, Navathe, Somayajulu and Gupta : Fundamentals of Database Systems, Pearson Education, 2006
2. Desai, Bipin C. : An Introduction to Database Systems.Galgotia Publication Pvt. Ltd., 2005.
3. Feuerstein and Pribyl. : Oracle PL/SQL Programming, 4th Edition, O'Reilly Media , Inc. , 2009

BOOKS FOR ADDITIONAL READING :

1. Date, C. J. : An Introduction to Database Systems, 7th Edition, Pearson Education Asia, 2001
2. Silberschatz, Korth, Sudarshan : Database System Concepts, 5th Edition, McGraw Hill International, 2006
3. Loney Kevin. : Oracle Database 10g - The Complete Reference , Tata McGraw-Hill , 2006
4. Documentation of relevant software packages

OPERATING SYSTEM PRINCIPLES

COURSE NO: PS02CMCA24

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Introduction to Operating Systems**
   - Understanding the role of operating systems
   - Interrupt handling
   - Evolution of computer architecture
   - Operating system structure and operations
   - Operating system services
   - Operating system interfaces, device drivers, system calls
   - Shells
   - Operating system design and implementation through different structures
   - Virtual machines
   - Operating system generation, system boot

2. **Process Management**
   - The concept of a process
   - Scheduling of processes
   - Interprocess communication
   - Multithreading: concepts, advantages, models
   - Schedulers: long term, middle term, short term
   - CPU scheduling: criteria, algorithms and their evaluation, multiprocessor scheduling, thread scheduling
   - Introduction to process synchronization
   - The critical section problem and Peterson's solution
   - Synchronization hardware
   - Semaphores and their uses
   - Classic problems of synchronization
   - Monitors
   - Deadlocks and methods to handle them, including prevention, avoidance and detection and recovery from them

3. **Memory Management**
   - Basic concepts of memory management
   - Swapping
   - Contiguous memory allocation
   - Paging
   - Page table organizations
   - Segmentation
   - Issues with memory management schemes

- Virtual memory, Demand paging
- Page replacement
- Allocation of frames
- Selection of page size and its impact on performance

4. **Secondary Storage Management**
   - File Systems
   - File attributes, operations, types, access methods
   - Directory structure, file system mounting
   - Mass storage structure-magnetic disk, magnetic tapes
   - Disk structure, disk attachment
   - Disk Scheduling
   - RAID structures

MAIN REFERENCE BOOKS:

1. Silbetschatz, Galvin, Gagne: Operating System Concepts, 8th edition, John Wiley and Sons, Inc., 2008
2. Tanenbaum A. S. : Modern Operating Systems, 3rd edition, Prentice-Hall, 2008

BOOKS FOR ADDITIONAL READING:

1. Nutt G. : "Operating Systems" : 3rd Edition, Pearson Education, 2004
2. Tanenbaum A. S., Woodhull A.S. : "Operating Systems Design and Implementation", 3rd edition, Prentice Hall, 2006

COURSE NO : PS02CMCA25

PRACTICALS

Practicals based on PS02CMCA22 and PS02CMCA23

STATISTICAL AND OPTIMIZATION TECHNIQUES
COURSE NO: PS02FMCA21

(3 Lectures & 1 Seminar/Tutorial per week Total Marks: 100)

COURSE CONTENT:

1. **Basic Statistical Techniques - I**
   - Frequency Distributions.
   - Measures of Central Tendency & Measures of Dispersion
   - Least square fit

2. **Basic Statistical Techniques - II**
   - Regression, Algorithm for linear regression.
   - Correlation & Multiple correlation.
   - Time Series, Components of Time Series, and Methods on Measurement of components.

3. **Linear Programming**
   - Mathematical model, assumptions of linear programming.
   - Graphical solution, simplex method.
   - Transportation & Assignment models.

4. **Project Scheduling in PERT-CPM & Special types of Optimization Techniques**
   - Diagram representation and critical path calculations.
   - Introduction to Dynamic Programming concept.
   - Sequencing Problems.

MAIN REFERENCE BOOKS:

1. Murray R Spiegel : Theory and Problem of Statistics McGraw-Hill Schaum's Outline Series,1981.
2. Sharma S.D. : Operations Research. Kedar Nath Ram Nath & Co. Meerut , 1988-89.
3. Taha H. A. : Operations Research Macmillan, New York (1987)

BOOKS FOR ADDITIONAL READING :

1. Gupta S.C. & Kapoor V. K.: Fundamental of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 1982.
2. Bronson Richard : Operations Research Schaum's outline Series, 1983.
3. Gillett B. E.: Introduction to Operations Research - a computer oriented algorithmic approach, McGraw-Hill , 1976