<table>
<thead>
<tr>
<th>YR</th>
<th>SUBJECT CODE</th>
<th>SUBJECT NAME</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td></td>
<td>Discrete Mathematical Structure</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Data structures &amp; Algorithms</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Database Management System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Software Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Electronics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineering Economics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DBMS Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data structure &amp; Algorithm Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Electronics Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unix Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>19</td>
<td>2</td>
<td>10</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>Introduction to Data</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Analysis &amp; Algorithms</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Java Programming Language</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Theory of Construction</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizational Behaviour &amp; Management Practices</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soft Skills -Vocabulary &amp; Usage</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAA Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>JAVA Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network Lab – II</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web Development Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>17</td>
<td>4</td>
<td>10</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>Cloud Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Real Time System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Mining &amp; Warehousing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective-I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective - II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective 1 Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Mining &amp; Warehousing Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor Project</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seminar</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>15</td>
<td>0</td>
<td>14</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>EIGHTH SEMESTER</td>
<td></td>
<td>Information System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Security</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parallel Programming</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective 1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective 2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective 3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Major Project</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seminar/Dissertation</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>15</td>
<td>0</td>
<td>12</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>
Second Year-third Semester

Discrete Mathematical Structure


Semigroups, Groups and Coding: Binary Operations, Semigroups, Products and Quotients of Semigroups, Groups, Product and Quotients of Groups, Coding of Binary Information and Error Correction, Decoding and Error Correction.

Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrapositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.


Suggested Books
Data Structures & Algorithms

Introduction: Data structure, abstract data types.

Linear Data Structures: Arrays, linked lists, stacks, queues, postfix, infix, prefix expressions and their conversion, evaluation of postfix expression, recursion, Tower of Hanoi problem, hashing and symbol tables, Huffman algorithm.

Non-Linear Data Structures: Trees and their traversals, binary trees, binary search trees, heaps, AVL trees, graph and their traversal.

Sorting and Searching: Sorting - insertion, selection, bubble, quick, heap, merge, shell, counting, bucket and radix sort, searching – sequential and binary.

Analysis of Algorithms: Time and space complexity of algorithms, Big oh, Theta and Omega notations, performance analysis, best, worst, average case analysis of simple algorithms, performance measurement.

Suggested Books-

1. DSA by Herbert Schildt, Tata McGraw Hills, 3rd Edition

Database Management System

Overview of DBMS: File system versus DBMS, advantages of DBMS, database users, data abstraction, data independence, database system structure. Data Models: Relational model, hierarchal model and network model.

Entity Relationship Model - overview of data design, entities, attributes and entity sets, relationship and relationship sets, features of the ER model – key constraints, participation constraints, weak entities, class hierarchies, aggregation, conceptual data base design with ER model – entity versus attribute, entity versus relationship, binary versus ternary relationship and aggregation versus ternary relationship.

Relational Algebra and Calculus: Relational algebra – selection, projection, set operations, renaming, joins, division, relational calculus, expressive power of algebra and calculus.

SQL Queries, Programming and Triggers: The forms of a basic SQL query, union, intersect and except, nested queries, correlated nested queries, set comparison operations, aggregate operators, null values and embedded SQL.

Schema Refinement and Normal Forms: Introduction to schema refinement, functional dependencies, normalization - decomposition, 1NF, 2NF, 3NF, BCNF, multi valued functional dependencies, 4NF.

File Organization: Secondary storage devices, RAID, buffer management, heapfiles, sorted files, hashing – static and dynamic, indexing - single level, multi level, static and dynamic, B-tree, B+-tree, ISAM.
Transaction Management: Transaction-concepts, states, ACID property, schedule, serializability of schedules, concurrency control techniques - locking, timestamp, deadlock handling, recovery-log based recovery, shadow paging.


Suggested Books-
4. C.J. Date: Data Base Design, Addison Wesley
5. Hansen and Hansen : DBM and Design, PHI

Software Engineering

System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering system analysis, modeling the architecture, system specification.

Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling. Software Development: Life Cycle (SWDLC), SWDLC models software engineering approaches


Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation.

Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling. Object Oriented Design: OOD concepts and methods class and object definitions, refining operations. Class and object relationships, object modularization. Introduction to Unified Modeling Language

Suggested Books:
1. Software Engineering by Pankaj Jalote by New Age International Publishers
2. Software Engineering by Pressman
Digital Electronics

**Introduction to Boolean algebra:** Binary connectives, Evaluation of truth functions, Truth – function calculus as Boolean Algebra, Duality, Fundamental theorems of Boolean Algebra and simplification of Boolean expressions. Realisation of Logic Circuits: Standard forms of Boolean Functions, Minterm and Maxterm, designation of functions. Simplification of functions on Karnaugh maps, incompletely specified functions.


**Counters and shift registers:** Ripple, decade, up-down counters, Mod-n counters and series, parallel registers. General characteristic of sequential circuits, clock, pulse and level mode sequential circuits. Analysis and design of sequential circuit. Synthesis of state diagrams, finite memory circuits, equivalence relations, equivalent states and circuits, determination of classes of in distinguishable states and simplification by implicant tables. Mealy and Moore machines, state assignment and memory element input equation, Partitioning and state assignment. General pulse-mode circuits, clock input counters, extended state tables.

**Asynchronous Mode Circuits:** Analysis of a fundamental mode circuits, Synthesis of flow tables, minimization, transition tables, excitation maps and output maps, Cycles and Races, Race free assignments, Hazards in sequential circuits. Introduction to A/D and D/A converters.

*Suggested Books:*
5. Malvino leech: Digital Electronics

Engineering Economics

**Introduction to Engineering Economics:** Origin, principles, engineering economics and the design process, engineering for economic competitiveness, engineering economy and the engineer.

**Elements of Economics:** Definition, demand and supply, income, equilibrium, utility.

**Economics Applied to Industries:** Market demand analysis, production analysis for decision making, cost analysis, pricing techniques in regards of goods and services, break-even analysis, interest, annuities and profits.

**Replacement Analysis:** Capital recovery, depreciation methods for replacement studies.

Suggested Books:
2. Schaum’s Outline for Engineering Economics by Jose A Sepulveda

DBMS Lab

List of Experiments
1. Stating a database design & application problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a standalone and shared database including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

Data Structures And Algorithms Lab

List of Experiments
S. No. Experiment
1. Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2. Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3. Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4. Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5. Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6. Repeat exercises 2, 3 & 4 with linked structures.
7. Implementation of binary tree with operations like addition, deletion, traversal.
8. Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9. Implementation of binary search in arrays and on linked Binary Search Tree.
10. Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

Digital Electronics Lab

List of Experiments
1. Truth table verification – NAND gate, NOR gate, OR gate, AND gate, NOT gate
2. Verifying if NAND gate is a universal gate.
3. Constructing XOR gate using NOR gate only.
4. Realizing given truth table using SOP form.
5. Realizing given truth table using POS form.
7. Design of binary-gray encoder.
8. Design of parity generator and detector.

UNIX Shell Lab

List of Experiments
1. Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dspace, du, ulimit.
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following
   (i) Interactive shell scripts
   (ii) Positional parameters
   (iii) Arithmetic
   (iv) If then- fi, if-then-else-fi, nested if-else
   (v) Logical operators
   (vi) else + if equals elf, case structure
   (vii) while, until, for loops, use of break
   (viii) Metacharacters
   (ix) System administration: disk management and daily administration
4. Write a shell script to create a file in $USER/class/batch directory. Follow the instructions
   (i) Input a page profile to yourself, copy it into other existing file;
   (ii) Start printing file at certain line
   (iii) Print all the difference between two file, copy the two files at $USER/CSC/2007 directory.
   (iv) Print lines matching certain word pattern.
5. Write shell script for-
(i) Showing the count of users logged in,
(ii) Printing Column list of files in your home directory
(iii) Listing your job with below normal priority
(iv) Continue running your job after logging out.
6. Write a shell script to change data format. Show the time taken in execution of this script
7. Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8. Write a shell script to count lines, words and characters in its input(do not use wc).
9. Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10. Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.
11. Write a shell script to compute gcd lcm & of two numbers. Use the basic function to find gcd & lcm of N numbers.
12. Write a shell script to find whether a given number is prime. Take a large number such as 15 digits or higher and use a proper algorithm.

Second Year-Fourth Semester

Statistics & Probability Theory

Introduction: Discrete random variables Sample space, events, algebra of events, bernoulli’s trials, Probability & Baye’s theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.

Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF’s, moments and MGF’s for above distributions.

Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Normal regression and correlation analysis.

Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues. Discrete Parameter mark on chains: M/G/1 Queuing model, discrete parameter birth-death process.


Suggested Books-
1. Eddington, Sir A.S. "The Philosophy of Physical Science" (1939)
Computer Architecture


Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.


Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.

Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

Suggested Books-

Operating System

Overview: Definition, types of operating systems - mainframe, server, multiprocessor, personal computer, real-time, embedded and smart card, system calls and utilities. File Systems: File concept, user and system programmer view of file systems, different modules of a file system, disk organization, tape organization, disk-space allocation methods-contiguous, linked, indexed, directory structures, file protection, disk scheduling algorithms.

Process Management: Process concepts, threads, scheduling concepts, types of schedulers, scheduling algorithms, process state diagram, comparison of various algorithms.
Memory Management: Memory management techniques – partitioning, swapping, segmentation, paging, paged segmentation, comparison of techniques, techniques for supporting the execution of large programs - overlays, dynamic linking and loading, virtual memory concepts, implementation by demand paging.

Process Synchronization: Real and virtual concurrency, mutual exclusion, synchronization, inter process communication, critical section problem and its solution to semaphores – binary and counting semaphores, wait / signal operations and their implementation.

Deadlocks: Deadlock problem, characterization, prevention, avoidance, recovery.

Input/output: Input/output devices, device controllers, interrupt handlers, device drivers and terminal drivers.

Suggested Books-
1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.

Object Oriented Programming


Objects and Classes Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const and classes.

Arrays and strings: Arrays as class Member Data. Arrays of object, string. The standard C++ String class

Operator overloading Overloading unary operators. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable

Inheritance Concept of inheritance. Derived class and base class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation: Classes within classes, inheritance and program development. Pointer Addresses and pointers. The address-of operator & pointer and arrays. Pointer and Faction pointer and C-types string. Memory management: New and Delete, pointers to objects, debugging pointers

Virtual Function Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information

Streams and Files Streams classes. Stream Errors. Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, and printer output.
Templates and Exceptions

Function templates, Class templates
Exceptions
The Standard Template Library
Introduction algorithms, sequence containers, iterators, specialized iterators,
associative containers, strong user-defined object, function objects.

Suggested Books-
1. C++ by Herbert Schildt, Tata Mc Graw Hills
2. C++ by E Bala gurusawamy, Tata Mc Graw Hills, 3rd Edition

Computer Graphics

Introduction: Introduction to Raster scan displays, Storage tube displays, refreshing,
flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive.

Computer Graphics: Picture analysis, Overview of programmer’s model of interactive
graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse
polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).
2D & 3D Co-ordinate system: Homogeneous Co-ordinates, Translation, Rotation, Scaling,
Reflection, Inverse transformation, Composite transformation. Polygon Representation,
Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm,
Polygon Clipping algorithms.

Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets
removal, Scan line algorithm, Area based algorithms. Curves and Splines: Parametric and
Non parametric Representations, Bezier curve, BSpline Curves.

Rendering: Basic illumination model, diffuse reflection, specular reflection, phong shading,
Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV

Multimedia: Multimedia components, Multimedia Input/Output Technologies: Storage and
retrieval technologies, Architectural considerations, file formats. Animation: Introduction,
Rules, problems and Animation techniques.

Suggested Books –
1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice,
Pearson
4. Multimedia Information Networking, N.K.Sharda, PHI.

Soft Skil Grammar

Remedial Grammar: Errors of Accidence and syntax with reference to Parts of Speech;
Agreement of Subject and Verb; Tense and Concord; Conditional Clauses; Use of
connectives in Complex and Compound sentences; Question tags and short responses

Suggested Books-
1. Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980
1992
Object Oriented Programming Lab

List of Experiments
1. To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2. Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object’s data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
3. Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.
4. Demonstration friend function friend classes and this pointer.
5. Demonstration dynamic memory management using new & delete & static class members.
6. Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
7. Demonstrator use of protected members, public & private protected classes, multilevel inheritance etc.
8. Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes.

Operating Systems Lab

List of Experiments
1. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:
   • Scheduling
   • Deadlock
   • Memory Management Systems
   • File system simulator
Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.
2. One exercise shall be on simulation of algorithms reported in the recent conferences/journals and reproducing the results reported therein.

Computer Graphics Lab

List of Experiments
1. To produce a single pixel and pre specified pattern on screen
2. To implement features like changing background color, foreground color, resizing of window, repositioning of window:
3. To implement mid point algorithm to draw circle and ellipse:
4. Use the line drawing & circle drawing programs to draw composite objects containing only circle & lines. You can take shapes like a cart, car etc.
5. To Implement Clipping (various algorithms).
6. Simple fonts, graphical fonts, scalable fonts.
7. Input a polygon by drawing lines.

**Third Year - Fifth Semester**

**Introduction to Data Communications**

**Introduction and Basic Concepts:** Data communication, Networks, Network Topologies,, Network categories, The internet

**The OSI Model & TCP/IP Protocol:** The layers and their functions

**Signals:** Digital signals, Analog signals, Composite signals

**Transmission media:** Twisted Pair, Coaxial Cable, Fiber-Optic Cable, Radio Waves, Microwaves. Infrared.

**Encoding and Modulating:** Digital Transmission, Analog Transmission.

**Error Detection and Correction:** Types of errors, Redundancy, Detection Versus Correction, Error Detection, Error Correction, Hamming Code, Cyclic Redundancy Check, Checksum and Its idea.

**Multiple Access:** Random access, Controlled access, Channelization

**Local Area Networks (LANs):** LAN protocol architecture, Bridge, Layer 2 & layer 3 switches

**High-speed LANs:** Ethernet, Fibre channel

**Wireless LANs:** Main concepts, Bluetooth

**Reference Books:**

**Design and Analysis of Algorithms**
Background: Introduction, algorithms specification, time and space complexity, performance analysis, recurrence relations. Basic Traversal and Search Techniques: Breadth first traversal, depth first traversal, breadth first search and depth first search.


Dynamic Programming: General method, 0/1 Knapsack problem, least common subsequence, matrix chain multiplication. Back Tracking: General method, 4-queen problem, sum of subset problem.


Suggested Books-
4. Brassard: Fundamental of Algorithmics, PHI.
Java Programming Language

The Genesis of Java: The importance of Java to Internet, Java’s magic-the bytecode, the Java buzzwords, the continuing revolution, Java and HTML, using blocks of code, lexical issues, the Java class libraries.

Data Types, Variables and Arrays: strongly typed language, the simple types, integers, floating-point types, characters, literals, type conversion and casting, automatic type promotion in expressions, arrays, string, pointers, operators-arithmetic operators, the bitwise operators, relational operators, Boolean logical operators, the assignment operator, the ? operator, operator precedence, using parentheses, control statements-Java selection statements, iteration statements, jump statements.

Classes: Class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, the this keyword, garbage collection, the finalize() method, a stack class, overloading methods, using objects as parameters, a closer look at argument passing, returning objects, recursion, introducing access control, understanding static, introducing final, arrays revisited, introducing nested and inner classes, exploring the string class, using command-line arguments.

Inheritance: Inheritance basics, using super, creating a multilevel hierarchy, when constructors are called, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance, the object class.

Package, Interfaces and Exception Handling: Packages, access protection, importing packages, interfaces, exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java’s built-in exceptions, creating your own exception subclasses, using exceptions.

Multithreaded Programming: The Java thread model, the main thread, creating a thread, creating multiple threads, using isAlive() and join(), thread priorities, synchronization, interthread communication, suspending, resuming, and stopping threads, using multithreading.

I/O, Applets, and String Handling: I/O basics, reading console input, writing console output, the Print Writer class, reading and writing files, applet fundamentals, the transient and volatile modifiers, using instance of strictfp, native methods, problems with native methods, string constructors, string length, special string operations, character extraction, string comparison, searching strings, modifying a string, data conversion using value Of(), changing the case of characters within a string, String Buffer.
Suggested Books –

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
   Deitel: How to Program JAVA, PHI

   Publishing, Delhi.


Theory of Computation

Finite Automata and Regular Expression: Finite state systems, basic definitions, regular languages and regular expression, finite automata, Kleen theorem, pumping lemma for regular sets, decision algorithms, Myhill-Nerode theorem and minimization of finite automata.

Context-Free Grammars: Context-free grammars, union, concatenation of CFG, derivation trees, simplification of context-free grammars, Chomsky normal form, Greibach normal form, the existence of inherently ambiguous context-free languages.

Context-Free Languages and Pushdown Automata: Pushdown automata and context-free languages, pumping lemma for CFL, closure properties of CFL, decision algorithms for CFL.

Turing Machine: Turing machine model, techniques for turing machine construction, turing machines as language acceptor, combining turing machines, properties of recursive and recursively enumerable languages, universal turing machine.

Chomsky Hierarchy of Languages: Regular grammars, unrestricted grammars and turing machines, context-sensitive grammars and linear bounded automata.

Suggested Books-

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and
Computation, Narosa


Organizational Behavior and Management Practices

**Introduction:** Definition of management, importance of management, management functions or the process of management, roles of a manager, levels of management.

**Development of Management Thought:** Classical, neo-classical, behavioral and modern schools of management.

**Individual and Group Behavior:** Introduction to organizations and individuals, components of organization, individual and group behavior, group development stages, formal and informal groups.

**Motivation and Leadership:** Theory X and Y, maturity-immaturity theory, motivation theories with special emphasis on Maslow’s need hierarchy and its implication, functions of a leader, various approaches to leadership.

**Organizational Change and Conflict:** Process of change, managing resistance to change, types of conflicts - intra personal, interpersonal and organizational, managing conflicts.

**Types of Modern Organizations and Their Practices:** Learning organization, virtual organizations and recent management practices.

**Suggested Books**

1. Organizational behavior- Understanding and Managing Life at work ,Gary Johns , Alan Saks, Pearson

2. Management & Organizational Behaviour,Laurie J Mullins
Soft Skills-Vocabulary and Usage

Vocabulary and Usage: Word Formations (by adding suffixes and prefixes); Technical Word Formation; Synonyms, Antonyms, Homophones, and Homonyms; One Word Substitution; Misappropriations; Indianisms; Redundant Words; Phrasal Verb Idioms

Suggested Books-

1. Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980

Design & Analysis of Algorithms Lab

List of Experiments

1. Exploring a Binary Heap:
2. Merging two search trees:
3. Complete binary tree as an efficient data-structure:
4. Problems on Amortized Analysis
5. Computing a spanning tree having smallest value of largest edge
6. Shortest Path Problems:
7. A simple problem on sorted array
8. Finding the decimal dominant in linear time
9. Problems on Graphs. E Java Lab
List of Experiments

1. Develop an in depth understanding of programming in Java
2. Write Object Oriented programs
3. Develop understanding to developing packages & Interfaces
4. Develop understanding to developing Strings and exception handling
5. Develop applications involving file handling: I/O streams, File I/O.
6. Develop applications involving concurrency
7. Develop applications involving multi threading

Web Development Lab

List of Experiments

1. Develop a static html page using style sheet to show your own profile.
   • Add a page to show 5 photos and
   • Add a page to show your academics in a table
   • Add a page containing 5 links to your favorite website
   • Add navigational links to all above pages (add menu).
2. Update your homepage, by creating few html file.
3. Use Cascading Style Sheets to format your all pages in a common format.
4. Basic programs:
   • Write a simple "hello word" program.
   • Write a program to accept two strings (name and age) from user. Print welcome statement
   • Write a program to create a calculator, which can support add, subtraction and
multiply and division operation.

- Write a program to take input parameters for a table (no. of rows and no. of columns), and create the desired table.

- Create a "Contact Me" page -

  - Ask user to enter his name, email ID,

  - Use Java-Script to verify entered email address.

  - Store submitted value in a MySql database.

  - Display latest 5 submitted records in contact me page.

  - Display above record with navigation support. e.g. (next, previous, first, last).
Compiler Construction

Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping, Review of Finite automata lexical analyzer, Input, buffer, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.

Review of CFG Ambiguity of grammars, Introduction to parsing, Bottom up parsing Top down parsing techniques, Shift reduce parsing, Operator precedence parsing, Recursive descent parsing predictive parsers. LL grammars & passers error handling of LL parser. LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Introduction of automatic parser generator: YACC error handling in LR parsers.

Syntax directed definitions; Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using postfix notation and three address code, Representing TAC using triples and quadruples, Translation of assignment statement. Boolean expression and control structures.

Storage organization, Storage allocation, Strategies, Activation records, Accessing local and non local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.

Definition of basic block control flow graphs, DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Suggested Books –

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.

2. Holub, Compiler Design in C, PHI.

Artificial Intelligence

Meaning and definition of artificial intelligence. Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search, A* Algorithm, AO* algorithms etc, and various types of control strategies.

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic,
Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

Probabilistic reasoning, Baye's theorem, semantic networks scripts schemas, frames, conceptual dependency and fuzzy logic, forward and backward reasoning.

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning. Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

**Introduction to learning.** Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

**Suggested Books**

2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)

**Computer Networks**

**Overview and Network Model:** Network topologies, protocols and standards, basic elements of a network, OSI reference model, TCP/IP model, categories of networks- LAN, WAN and MAN.

**Physical Layer:** Manchester, differential Manchester encoding, NRZ, multilevel binary and biphase encoding, scrambling techniques, packet and circuit switching, transmission media. Data Link Layer: Framing, stop and wait protocol, sliding window protocol, performance and efficiency, HDLC, error detection, parity check, CRC. MAC Layer: Pure and slotted Aloha, throughput characteristics, CSMA/CD, performance. Local Area Network: IEEE 802.3, 802.4, 802.5, performance evaluation, FDDI, DQDB.

**Network Layer:** Virtual circuits, datagram, IPv4, IP address classes, subnetworking, supersubnetting, IP fragmentation, ARP, RARP, routing algorithms, RIP, OSPF, BGP, congestion control algorithms, leaky bucket, token bucket, ICMP, IPv6.

**Transport Layer:** Duties of the transport layer, Transport service primitives. TCP, TCP
services, TCP header, UDP header. Elements of Transport protocols: addressing, connection
Establishment, connection release, TCP connection establishment and release, transmission
policy, timer management, Transactional TCP Flow control & Buffering, Multiplexing,
Crash Recovery, UDP, RPC, RTP. Principles of Reliable Data Transfer: Reliable data transfer
over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.

Application Layer: Client/Server model, DNS, FTP, HTTP, SMTP, telnet.

SONET/SDH: Synchronous transport signals, physical configuration, SONET layers, SONET
frame, multiplexing STS frames and applications.

Suggested Books-

3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

Microcontroller & Microprocessor

**Introduction to Microprocessors**, microcontroller; 8085 Microprocessor Architecture, pin
description, Bus concept and organization; concept of multiplexing and demultiplexing of
buses; concept of static and dynamic RAM, type of ROM, memory map.

**Software architecture registers** and signals, Classification of instruction, Instruction set,
addressing modes, Assembly Language Programming and Debugging, Programming
Technique, instruction Format and timing.

**Advance Assembly Language Programming**, Counter and time delay; types of Interrupt
and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros,
subroutine; Stack- implementation and uses with examples; Memory interfacing.

**8085 Microprocessor interfacing**, 8255 Programmable Peripheral Interface,
8254programmable interval timer, interfacing of Input/output device, 8279 Key
board/Display interface.

**Microprocessor Application**: Interfacing scanned multiplexed display and liquid crystal
display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and
RS422A, Parallel interface- Centronics and IEEE 488.
Suggested Books -


3. Microprocessor architecture, programming, and applications with the 8085 By Ramesh S.

Software Project Management

Introduction to Project Management: Definition of the Project, Project Specification and parameters, Principles of Project Management, Project Management Life Cycle


Project Scheduling and Tracking Techniques: Why projects are delayed? Effort Estimation Techniques, Task Network and Scheduling Methods, Monitoring and Control Progress, Graphical Reporting Tools

Project Economics: Project Costing, Empirical Project Estimation Techniques, Decomposition Techniques, BEP, Automated Estimation Tools

Risk Analysis and Management: Risk Mitigation and Management, Software Metrics and Project Management

Project Control and Closure: Project Management Issues with regard to New Technologies

Suggested Readings:
1 Clements and Gido, Effective Project Management, Thomson India Edition
Technical Writing:

(A) Scientific Attitude and Impersonal Style; Plain Statements, Definitions; Description and Explanations (of objects, instruments, Processes, Scientific Principles, etc.)

(B) Summarizing and abstracting; Expressing ideas within a restricted word limit; Paragraph Writing (Paragraph division, introduction and the conclusion, Variety in sentences and paragraphs)

(C) Interpretation and use of charts, graphs and tables in technical writing.

(D) Punctuation

(E) Reading at various speeds (slow, fast, very fast); reading different kinds of texts for different purpose (e.g. for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.

(F) Comprehension of Unseen Passages

Suggested Books-

1 Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980

2 Sharma, R.S. Technical Writing. Delhi: Radha Publication, 1999


Aptitude/Reasoning

Covering all topics for Aptitude and Reasoning.
Microcontrollers & Microprocessors Lab

List of Experiments

1. Add the contents of memory locations XX00 & XX01 & place the result in memory location XX02.

2. Add the 16 bit numbers stored in memory location & store the result in another memory location.

3. Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.

4. Write a program to Swap two blocks of data stored in memory.

5. Write a program to find the square of a number.

6. Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.

7. Write a program to find largest & smallest number from a given array.

8. Write a program to Sort an array in ascending & descending order.

9. Write a program to multiply two 8 bit numbers whose result is 16 bit.

10. Write a program of division of two 8 bit numbers.

11. Generate square wave from SOD pin of 8085 & observe on CRO.

12. Write a program to perform traffic light control operation.

Compiler Designing Lab

List of Experiments

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of system programming concept. Lexical analysis, syntax analysis, semantics analysis, code optimization, code generation.
Language specification and processing

2. Develop an Understanding of Scanning by using concept of Finite state automaton.

3. Parse tree and syntax tree, Top down parsing (recursive decent parsing, LL (1) parser) Bottom up parsing (operator precedence parsing) .Managing symbol table, opcode table, literal table, pool table

4. Develop an Understanding of Intermediate code form: Three address code, Polish notation (Post Fix Strings)

5. Develop an Understanding of Allocation data structure. Heaps

6. Develop an Understanding about Language processor development tools: LEX, YACC.

**Fourth Year- Seventh Semester**

*Cloud Computing*

*Understanding cloud computing:* Introduction to Cloud Computing - Benefits and Drawbacks - Types of Cloud Service Development - Deployment models


*Text books:*

Real Time System

Introduction: Definition, Typical Real Time Applications, concept of tasks, types of tasks an real time systems, block diagram of RTS, and tasks parameters – Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements.


Clock Driven Scheduling – definition, notations and assumption, scheduler concepts, general scheduling structure, cyclic executives. Priority Driven Scheduling: notations and assumption, fixed priority verses dynamic priority, fixed priority scheduling algorithms (RM and DM) and their schedulability analysis, concept of schedulability tests – Inexact and exact schedulability tests for RM and DM, Optimality of the RM and DM algorithms, practical factors.


Suggested Books –

Data Mining and Warehousing

Overview, Motivation (for Data Mining), Data Mining - Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

Concept Description: Definition, Data Generalization, Analytica characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases – Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering - CURE and Chameleon.

Density Based Methods- DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – Statistical Approach, Neural Network approach, Outlier Analysis.

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Suggested Books –

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.

2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.

Data Warehousing & Mining Lab

List of Experiments

1. Gain insight for running pre-defined decision trees and explore results using MS OLAP Analytics.

2. Using IBM OLAP Miner – Understand the use of data mining for evaluating the content of multidimensional cubes.

3. Using Teradata Warehouse Miner – Create mining models that are executed in SQL

4. Publish and analyze a business intelligence portal.

5. Import metadata from specific business intelligence tools and populate a metadata repository.

6. Publish metadata stored in the repository.

7. Load data from heterogeneous sources including text files into a pre-defined warehouse schema.

8. Design a data mart from scratch to store the credit history of customers of a bank. Use this credit profiling to process future loan applications

9. Design and build a Data Warehouse using bottom up approach titled 'Citizen Information System'.

Fourth Year-Eight Semester

Information Security System

Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler’s, Fermat’s Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem,

Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field Elements of Information Theory: Entropy, redundancy of language, Key Equivocation & Unicity Distance, equivocation of a simple cryptographic system


Block Cipher Principles, Fiestel Cipher, Concept of ‘Confusion’ and “Diffusion” in block ciphers, Product Ciphers, Lucifer Algorithm. DES Algorithm, DES modes of operations, IDEA.


Public Key Cryptosystems: Principles of Public Key Cryptosystems, Factorization, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using


Digital Signatures: RSA Based, ElGamal Signatures, Undeniable Signatures. Authentication:

Model of Authentication Systems, Impersonation, Substitution and spoofing games, Authentication schemes for mutual authentication based on shared secret, two-way public key, one-way public key, Mediated Authentication, One way Authentication.

IPSec, AH & ESP in Transport and Tunnel mode with multiple security associations (Key Management not Included). SSL (Protocols Only) Intrusion Detection: Audit Reports, Statistical Anomaly Detection, Rule based detection, honeypots, intrusion detection exchange formats.


Suggested Books –


Parallel Programming

Fundamental theoretical issues in designing parallel algorithms and architectures. Parallel computers based on interconnection networks such as hypercubes, shuffle-exchanges, trees, meshes and butterfly networks.

Parallel algorithms for arithmetic, linear algebra, sorting, Fourier Transform, recurrence evaluation, and dense graph problems. Use of graph embedding techniques to compare different networks. Shared memory based parallel computers.

Algorithms for list ranking, maximal independent set, arithmetic expression evaluation, convex hull problems and others. Message routing on multidimensional meshes, Butterfly networks, Hyper cubes, Shuffle Exchange networks, Fat-trees and others.


Suggested Books-


PEARSON Education.