

**Unit-I**

**Introduction:** Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation

**Solution of Algebraic and Transcendental Equation:**

Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.

**Unit-II**

**Interpolation:** Finite Differences, Difference tables

Polynomial Interpolation: Newton's forward and backward formula

Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation,

**Unit-III**

**Numerical Integration and Differentiation:** Introduction, Numerical differentiation  
Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

**Unit-IV**

**Solution of differential Equations:** Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution

**Unit-V**

**Statistical Computation:** Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.

**References:**

1. Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
2. Gerald & Whealey, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

5. T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, "Numerical Analysis", TMH
8. Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
9. Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
10. Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

### TEE 303

### NETWORK ANALYSIS AND SYNTHESIS

**L T P**  
**3 1 0**

#### Unit – I :

**Graph Theory** : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis. 7

#### Unit – II :

**Network Theorems (Applications to ac networks):** Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem. 5

#### Unit – III :

##### Network Functions :

Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response and Bode plots. 9

#### Unit – IV :

##### Two Port Networks:

Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T &  $\Pi$  Representation. 7

#### Unit – V :

##### (a) Network Synthesis :

Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

##### (b) Filters :

Image parameters and characteristics impedance, passive and active filter fundamentals,

**Text Books:**

1. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2. D.Roy Choudhary, "Networks and Systems" Wiley Eastern Ltd.
3. Donald E. Scott : "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company.
4. A.Chakrabarti, "Circuit Theory" Dhanpat Rai & Co.

**Reference Books :**

5. M.E. Van Valkenburg, "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.
6. W.H. Hayt & Jack E-Kemmerly, "Engineering Circuit analysis" Tata McGraw Hill.
7. Soni, Gupta, "Circuit Analysis", Dhanpat Rai & Sons.
8. Ram Kalyan, "Linear Circuits" Oxford University Press.

**TCS-301****DISCRETE STRUCTURES**

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**Unit-I:**

**Set Theory:** Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets

**Relation:** Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation.

**Function:** Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Theorem proving Techniques: mathematical induction (simple and strong), pigeonhole principle, prove by contradiction.

**Unit-II:**

**Algebraic Structures:** Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

**Unit-III:**

**Posets, Hasse Diagram and Lattices:** Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded I and complemented lattices.

**Boolean Algebra:** Basic definitions, sum of products and product of sums, form in Boolean Algebra, Logic gates and Karnaugh maps.

**Tree:** Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

#### **Unit-IV:**

**Propositional Logic:** Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

#### **Unit-V:**

**Combinatorics & Graphs:** Recurrence Relation, Generating function., Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.

#### **Text books and Supplementary reading:**

1. Liptschutz, Seymour, “ Discrete Mathematics”, McGraw Hill.
2. Trembley, J.P & R. Manohar, “Discrete Mathematical Structure with Application to Computer Science”, McGraw Hill.
3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill.
4. Deo, Narsingh, “Graph Theory With application to Engineering and Computer.Science.”, PHI.
5. Krishnamurthy, V., “Combinatorics Theory & Application”, East-West Press Pvt. Ltd., New Delhi.

### **TCS 302**

#### **DATA STRUCTURES USING - C**

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#### **Unit - I**

**Introduction:** Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off

**Arrays:** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors.

**Stacks:** Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

**Recursion:** Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion, Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

## **UNIT - II**

**Queues:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

**Linked list:** Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

## **UNIT – III**

**Trees:** Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

**Searching and Hashing:** Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

## **UNIT – IV**

**Sorting:** Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

**Binary Search Trees:** Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

## **UNIT - V**

**Graphs:** Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

**File Structures:** Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

### **Reference text books:**

1. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., New Delhi.

2. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

**Supplementary reference books:**

1. K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors Pvt. Ltd.
2. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
3. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore)

**TEC-302**

**SWITCHING THEORY**

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**3 1 0**

**Unit-I : Introduction**

Characteristics of digital system, Types of Digital circuits, Number system: Direct conversion between bases Negative numbers & BCD and their arithmetic's, Boolean Algebra, Minimization of Boolean Functions :Map & Tabular method upto 6 variable and multiple output circuits Error detecting & correcting codes, Hamming & cyclic codes. 6

**Unit-II : Combinational Logic Circuits**

Design Procedure, Adders, subtractors & code conversion, Multiplexers/ Demultiplexers, encoder / decoders, decimal adders & amplitude comparators, ROM as decoder, PLA & PAL. 6

**Unit-III : Sequential Logic Circuits**

Flip –Flops and their conversions, Analysis and synthesis of synchronous sequential circuit, excitation table, state table & state diagram. Design of synchronous counters, shift registers and their applications.

**Algorithm State Machine:** ASM chart, Timing considerations, Control Implementation Design with Multiplexers, PLA control

**Asynchronous Sequential Circuits:** Analysis Procedure Reduction of state & flow table, Race free state assignment. 10

**Unit-IV : Logic Families**

Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, Fan-in, Fan-out, Noise margin, circuit concept and comparison of various logic families: TTL, IIL, ECL, NMOS, CMOS Tri-state logic, open collector output, Interfacing between logic families, packing density, power consumption & gate delay. 8

**Unit-V : Hazard and Fault Detection**

**Static and dynamic Hazard :** Gate delay, Generation of spikes, Determination of hazard

in combinational circuits, Fault detection methods: Fault Table & Path sensitizing methods. 5

### Unit-VI : Memories

Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks. 5

#### Text Books :

1. Digital Design by M Moris Mano, 2<sup>nd</sup> Edn.PHI
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH

#### Reference Books :

1. Switching Circuit & Logic Design by Hill & Peterson, Wiley
2. Digital Circuit & Logic Design, by Holsworth.

### TEE 353

### NETWORK LAB

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**Note : Minimum eight experiments are to be performed from the following list.**

1. Verification of principle of superposition with dc and ac sources
2. Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits
3. Verification of Tellegen's theorem for two networks of the same topology
4. Determination of transient response of current in RL and RC circuits with step voltage input
5. Determination of transient response of current in RLC circuit with step voltage input for underdamp, critically damp and overdamp cases
6. Determination of frequency response of current in RLC circuit with sinusoidal ac input
7. Determination of z and h parameters (dc only) for a network and computation of Y and ABCD parameters
8. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values
9. Determination of image impedance and characteristic impedance of T and  $\Pi$  networks, using O.C. and S.C. tests

Write Demo for the following (in Ms-Power point)

10. Verification of parameter properties in inter-connected two port networks : series, parallel and cascade also study loading effect in cascade
11. Determination of frequency response of a Twin – T notch filter
12. College may add any three experiments in the above list.

**Write Programs in 'C' Language:**

1. To deduce error involved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi, Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
3. To implement Newton's Forward and Backward Interpolation formula.
4. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula
5. To implement Newton's Divided Difference and Langranges Interpolation formula.
6. To implement Numerical Differentiations.
7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
8. To implement Least Square Method for curve fitting.
9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of  $R^2$  for atleast two independent variables.

**Write Program in C or C++ for following.**

- Array implementation of Stack, Queue, Circular Queue, List.
- Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.
- Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
- Implementation of Searching and Sorting Algorithms.
- Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm.

**TEC-352**

**DIGITAL ELECTRONICS LAB**

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1. Bread-board implementation of various flip-flops.
2. Bread-board implementation of counters & shift registers.
3. Determination of Delay time and NAND, NOR, Ex-OR, AND & OR Gates.
4. Transfer characteristics of TTL inverters & TTL Schmitt Trigger inverter.
5. Transfer characteristics of CMOS inverters series and CD40 series and estimation of Gate delay of CD40 series CMOS inverter.
6. Monoshot multivibrators using 74121 and 74123.
7. Clock circuit realization using 555 and CMOS inverter and quartz crystal.
8. Adder/ subtractor operation using IC7483 4 bit/ 8 bit.
9. Demultiplexer / Decoder operation using IC-74138.
10. Modulo N counter using programmable counter 74190.

**TCS 401**

**COMPUTER ORGANIZATION**

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**Unit-I**

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

**Unit-II**

**Control Design:**

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

### Unit-III

#### Processor Design:

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

### Unit -IV

#### Input-Output Organization:

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

### Unit-V

#### Memory Organization:

Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D and 2<sup>1/2</sup>D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

#### *Text Book:*

1. Computer System Architecture, M. Mano(PHI)

#### *Reference Book:*

1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)
2. Structured Computer Organization, Tannenbaum(PHI)
3. Computer Organization, Stallings(PHI)
4. Computer Organization, John P.Hayes (McGraw Hill)

### TCS 402

#### DATABASE MANAGEMENT SYSTEM

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### Unit- I

**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

#### Data Modeling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

### Unit- II

**Relational data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra,

relational calculus, tuple and domain calculus,

**Introduction to SQL:** Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

### **Unit- III**

#### **Data Base Design & Normalization:**

Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

### **Unit- IV**

**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

### **Unit- V**

**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

#### **Text Books**

- 1 Date C J, "An Introduction To Database System", Addison Wesley
- 2 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
- 3 Elmasri, Navathe, "Fundamentals Of Database Systems", Addison Wesley
- 4 Leon & Leon, "Database Management System", Vikas Publishing House.

#### **References**

- 1 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
- 2 Majumdar & Bhattacharya, "Database Management System", TMH
- 3 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.

**OBJECT ORIENTED SYSTEMS****L T P****3 1 0****Unit – I**

**Object Modeling:** Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

**Unit – II**

**Dynamic Modeling:** Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

**Unit – III**

**Functional Modeling:** Data flow diagram, specifying operations, constraints, a sample functional model. OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

**Unit – IV**

**Java Programming:** Introduction, Operator, Data types, Variables, Methods & Classes, Multithread Programming, I/O, Java Applet.

**Java Library:** String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and Menus, Images, Additional packages.

**Unit – V****Software Development using Java:**

Java Beans, Java Swing, Java Servlets, Migrating from C++ to java, Application of java, Dynamic Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabbles, JDBC, Brief functioning of upper layer E-mail and their applications.

***Text Books:***

1. James Rumbaugh et al, “Object Oriented Modeling and Design”, PHI
2. Herbert Schildt, “The Complete Reference: Java”, TMH.
3. E. Balagurusamy, “Programming in JAVA”, TMH.

***References:***

1. Booch Grady, “Object Oriented Analysis & Design with application 3/e”, Pearson Education, New Delhi.
2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley
3. E. Balagurusamy, “Object Oriented Programming with C++”, TMH.

**Unit-I: Introduction**

Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes.

Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

**Unit-II: Software Requirement Specifications (SRS)**

Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

**Unit-III: Software Design**

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.

Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

**Unit-IV: Software Testing**

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.

Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

**Unit-V: Software Maintenance and Software Project Management**

Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities,

Change Control Process, Software Version Control, An Overview of CASE Tools.  
Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

**Reference Books:**

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
5. Ian Sommerville, Software Engineering, Addison Wesley.
6. Pankaj Jalote, Software Engineering, Narosa Publication
7. Pfleeger, Software Engineering, Macmillan Publication.
8. A. Leon and M. Leon, Fundamentals of Software Engineering, Vikas Publication.

**TCS 405**

**THEORY OF AUTOMATA & FORMAL LANGUAGES**

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**Unit – I**

Introduction to defining language, Kleene closures, Arithmetic expressions, defining grammar, Chomsky hierarchy, Finite Automata (FA), Transition graph, generalized transition graph.

**Unit – II**

Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA), Construction of DFA from NFA and optimization, FA with output: Moore machine, Mealy machine and Equivalence, Applications and Limitation of FA

**Unit – III**

Arden Theorem, Pumping Lemma for regular expressions, Myhill-Nerode theorem, Context free grammar: Ambiguity, Simplification of CFGs, Normal forms for CFGs, Pumping lemma for CFLs, Decidability of CFGs, Ambiguous to Unambiguous CFG.

**Unit – IV**

Push Down Automata (PDA): Description and definition, Working of PDA, Acceptance of a string by PDA, PDA and CFG, Introduction to auxiliary PDA and Two stack PDA.

**Unit – V**

Turing machines (TM): Basic model, definition and representation, Language acceptance by TM, TM and Type – 0 grammar, Halting problem of TM, Modifications in TM,

Universal TM, Properties of recursive and recursively enumerable languages, unsolvable decision problem, undecidability of Post correspondence problem, Church's Thesis, Recursive function theory, Godel Numbering.

***Text Books and References:***

1. Hopcroft, Ullman, "Introduction to Automata Theory, Language and Computation", Nerosa Publishing House
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science(Automata, Languages and Computation)", PHI
3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
4. Papadimitrou, C. and Lewis, C.L., "Elements of theory of Computations", PHI
5. Cohen D. I. A., "Introduction to Computer theory", John Wiley & Sons
6. Kumar Rajendra, "Theory of Automata (Languages and Computation)", PPM

**COMPUTER ORGANIZATION LAB**

**TCS 451**

**L T P**  
**0 0 2**

1. Bread Board Implementation of Flip-Flops.
2. Experiments with clocked Flip-Flop.
3. Design of Counters.
4. Bread Board implementation of counters & shift registers.
5. Implementation of Arithmetic algorithms.
6. Bread Board implementation of Adder/Subtractor (Half, Full)
7. Bread Board implementation of Binary Adder.
8. Bread Board implementation of Seven Segment Display.

Institute may also develop the experiment based on the infrastructure available with them.

**TCS 452**

**Java Programming LAB**

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TCS-454

DBMS LAB

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### The Queries to be implemented on DBMS by using SQL.

1. Write the queries for Data Definition and Data Manipulation language.
2. Write SQL queries using Logical operators (=,<,>,etc.).
3. Write SQL queries using SQL operators (Between.... AND, IN(List), Like, ISNULL and also with negating expressions ).
4. Write SQL query using character, number, date and group functions.
5. Write SQL queries for Relational Algebra (UNION, INTERSECT, and MINUS, etc.).
6. Write SQL queries for extracting data from more than one table (Equi-Join, Non-Equi-Join , Outer Join)
7. Write SQL queries for sub queries , nested queries.
8. Write programs by the use of PL/SQL.
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS.
10. Create VIEWS, CURSORS, and TRIGGRS & write ASSERTIONS.
11. Create FORMS and REPORTS .

\* Students are advised to use **Developer 2000/Oracle-9i** version or other latest version for above listed experiments. However depending upon the availability of software's, students may use **Power Builder /SQL SERVER**. Mini Project may also be planned & carried out through out the semester to understand the important various concepts of Database.