**Database Management Systems**

**UNIT I Introduction:** Concept & Overview of DBMS, Data Models-, Network, Hierarchical and Relational Model, Levels of abstraction. Administrator, Database Users, Three Schema architecture of DBMS, Application. Entity-Relationship Model: : Entities, Attributes and Entity Sets, Relation and Relationships sets, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

**UNIT II Relational Model:** Structure of relational Databases, Relational Algebra and Relational Calculus, Operations on Relational Algebra, Operations on Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus. SQL and Integrity Constraints: Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, Introduction to views, Querying, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.

**UNIT III Relational Database Design:** Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF. Internals of RDBMS: Physical data structures, Query optimization: join algorithm, statistics and cost base optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

**UNIT IV Recovery System:** Types of Failures, Recovery Techniques, ARIES. Concurrency Control: Serial and Serializable Schedules-Conflict Serializability –Enforcing Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation. Transaction Management: ACID Properties, Transaction states, Serializability and Recoverability-View, Serializability-Resolving Deadlocks-Distributed Databases: Commit and Lock

**Essential of Information Technology**

**UNIT-I Introduction:** Importance and features of Java, Concepts of Java Virtual machine (JVM), Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations. Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading. Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes. Packages and Interfaces, exception handling.

**UNIT-II Design of User Interfaces:** Swing, Applet, Icons and Labels, Text Fields, Buttons, button Class, Check Box, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables.

**UNIT-III Servlets:** Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and running servlet, Reading the servlet Parameters, Reading Initialization parameter, Packages- javax.servlet Package, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

**UNIT-IV Advance Java:** Collection, list, Map, Tree, Hashing. JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data.

**Computer Organization & Architecture**

**Unit- I Data representation and Computer arithmetic:** Introduction to Computer Systems, Organization and architecture, Von Neumann Architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth’s algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

**Unit-II Basic Computer organization and Design:** Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Micro programmed Control s organization, Control Memory, address sequencing, Micro program Example, micro instruction format, Horizontal Vs Vertical micro-programming, design of control Unit, microprogram sequencer, Hardwired v/s Micro-programmed Control Unit.

**Unit-III Central Processing Unit:** General register organization, stack organization, instruction formats (Zero, One, Two and Three Address Instruction), addressing modes, Data transfer and manipulation, Program control. CISC and RISC: features and comparison. Pipeline and vector Processing, Parallel Processing, Flynn's taxonomy, Pipelining, Instruction Pipeline, Basics of vector processing and Array Processors**.**

**Unit-IV Input-output organization: I/O interface.** I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor , CPU-IOP communication, Serial communication

**Parallel and Distributed Computing**

**Unit-I Introduction:** The state of computing, system attributes to performance, multiprocessors and multicomputer, multivector and SIMD computers, basics of parallel programming models, parallel algorithms and distributed processing, Conditions of parallelism: Data, control and resource dependencies, Hardware and software parallelism. Hardware Taxonomy: Flynn’s classification, Shore’s classification, Feng’s classification, Handler’s classification. Software taxonomy: Kung’s taxonomy.

**Unit-II Abstract parallel computational models:** combinational circuits, sorting network, PRAM models, VLSI complexity model, architecture development tracks, program partitioning and scheduling, program flow mechanisms. Performance metrics and measures: parallelism profile in programs, mean performance, efficiency, utilization and quality, benchmarks and performance measures. Parallel processing applications: Massive parallelism for grand challenges, application models for parallel computing, scalability of parallel algorithms. Speedup performance laws: Amdahl’s law for fixed workload, Gustafson’s Law for scaled problems and memory bounded speedup model. Scalability analysis and approaches: Scalability metrics and goals, evaluation of scalable computers.

**Unit-III Pipelining and Superscalar Techniques**: Linear pipeline processors, nonlinear pipeline processors, arithmetic pipeline design, and superscalar pipeline design. Parallel programming models: Shared-variable model, message-passing model, data-parallel model, object-oriented model and functional and logic models. Case studies of parallel processors: ICL distributed array processor (DAP), ILLIAC IV Computer, Tilera’s TILE64 system, Sun UltraSparc T2 processor, Intel Pentium Processors.

**Unit-IV Scheduling and parallelization**: Loop parallelization and pipelining-Loop transformation theory, parallelization and wave fronting, tiling and localization, software pipelining, program partitioning and scheduling: Grain size, latency, grain packing and scheduling. Parallel Architecture for cognitive functions: Artificial neuron model (perceptron), neural network as classifiers, learning by perceptrons, supervised training of perceptron networks, SLT model and Hopfield network.