**Comprehensive Examination – B.Tech (IT)**

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| **S. No** | **Course Title** |
| 1. | Digital Logic and Microprocessor |
| 2. | Computer Architecture and Organization |
| 3. | Programming, Data Structures and Algorithms |
| 4. | Theory of Computation |
| 5. | Web Technologies |
| 6. | Operating System |
| 7. | Database Management Systems |
| 8. | Data Communication and Computer Networks |

**Digital Logic and Microprocessor:**

Simplification of Boolean functions using K-Map – Combinational logic: Adder, subtractor, encoder, decoder, multiplexer, demultiplexer – Sequential Logic: Flip flops- 8086 Microprocessor: instructions – peripherals: 8255, 8254, 8257.

**Computer Architecture and Organization:**

Instructions - Instruction types- Instruction Formats - Addressing Modes- Pipelining- Data Representation - Memory Hierarchy- Cache memory-Virtual Memory- I/O Fundamentals- I/O Techniques - Direct Memory Access - Interrupts-RAID architecture

**Programming, Data Structures and Algorithms:**

Programming in C; Algorithm Analysis – Iterative and Recursive Algorithms; ADT - Stack and its Applications - Queue and its Applications; Data Structures – Arrays and Linked Lists; Algorithms - Sorting  – Searching; Trees – BST, AVL; Graphs – BFS , DFS , Dijkstra’s Shortest Path Algorithm.

**Theory of Computation:**

Deterministic Finite Automata, Non deterministic Finite Automata, Regular Expressions, Context Free Grammar, Push down Automata and Context Free Languages, Turing Machines.

**Web Technologies:**

Web Architecture- JavaScript – objects String, date, Array, Regular Expressions, DHTML-HTML DOM Events; Web Server – HTTP- Request/Response model-RESTful methods- State Management – Cookies , Sessions – AJAX.

**Operating Systems:**

Processes, Threads, Inter‐process communication, CPU scheduling, Concurrency and synchronization, Deadlocks, Memory management and Virtual memory & File systems.

**Database Management System:**

DBMS, Schema, catalog, metadata, data independence, pre-compiler; Users-naïve, sophisticated, casual ;ER Model- Entity, attributes, structural constraints; Relational Model-Constraints, Relational Algebra operations; SQL- DDL, DML, TCL, DCL commands, basic queries and Top N queries; Normalization-properties, 1NF, 2NF, 3NF, BCNF; Indexing-different types, Hash Vs B-tree Index; Transaction-problems, Concurrency Control-techniques, Recovery-methods.

**Data Communication and Computer Networks:**

Circuit Switching, Packet Switching, Frame Relay, Cell Switching, ATM , OSI Reference model, TCP\IP, Network topologies, LAN Technologies, Error detection and correction techniques, Internet protocols , IPv4/IPv6, Routing algorithms, TCP and UDP, Sockets, Congestion control, Application Layer Protocols, Network Security: Basics of public and private key cryptosystems-Digital Signatures and Hash codes, Transport layer security, VPN, Firewalls.