K. R. MANGALAM UNIVERSITY
DESTINATION SUCCESS

SYLLABUS

Computer Science and Engineering

1. **Set Theory & Algebra:**
   - Sets: Basics, operations, subsets, power sets
   - Relations: Types of relations, equivalence relations, functions as relations
   - Functions: Domain, codomain, range, composition of functions, inverse functions
   - Groups: Group axioms, subgroups, cyclic groups, permutation groups
   - Partial Orders: Partially ordered sets, Hasse diagram, total orders
   - Lattice: Lattices, bounded lattices, distributive lattices
   - Boolean Algebra: Boolean operations, Boolean functions, minimization techniques
2. **Digital Logic:**
   - Boolean Algebra: Laws, theorems, simplification techniques
   - Combinational Circuits: Logic gates, truth tables, Karnaugh maps
   - Sequential Circuits: Flip-flops, registers, counters, state diagrams
   - Number Systems: Binary, octal, hexadecimal, two's complement representation
   - Logic Families: TTL, CMOS, ECL
   - Memory Devices: RAM, ROM, types of memory organization
3. **Computer Organization and Architecture**:
   - Instruction Set Architecture: RISC, CISC, addressing modes
   - Processor Design: ALU design, control unit design, pipelining
   - Memory Hierarchy: Cache memory, virtual memory, memory management techniques
   - Input/Output Systems: I/O interfacing, interrupt handling, DMA
   - Microprocessors: Architecture, instruction set, interfacing
4. **Programming and Data Structures:**
   - Programming in C/C++: Syntax, control structures, functions, pointers

- Data Structures: Arrays, linked lists, stacks, queues, trees, graphs
- Algorithms: Sorting algorithms, searching algorithms, algorithm analysis
- Object-Oriented Programming: Classes, objects, inheritance, polymorphism
- Recursion: Recursive algorithms, recursion vs. iteration

5. Algorithms:

- Divide and Conquer: Merge sort, quicksort, binary search
- Dynamic Programming: Memoization, bottom-up approach
- Greedy Algorithms: Activity selection, Huffman coding, Dijkstra's algorithm
- NP-Hard & NP Complete: Complexity classes, reduction techniques

6. Theory of Computation:

- Finite Automata: Deterministic and non-deterministic finite automata
- Regular Languages: Regular expressions, pumping lemma
- Context-Free Languages: Context-free grammars, pushdown automata
- Turing Machines: Turing machine model, halting problem
- Computability and Complexity: P vs. NP problem, complexity classes

7. Compiler Design:

- Lexical Analysis: Tokenization, regular expressions, finite automata
- Syntax Analysis: Parsing techniques, context-free grammars
- Semantic Analysis: Type checking, symbol tables
- Code Generation and Optimization: Intermediate code generation, optimization techniques

8. Operating Systems:

- Processes and Threads: Process states, scheduling algorithms, thread synchronization
- Memory Management: Paging, segmentation, virtual memory
- File Systems: File organization, directory structure, file allocation methods
- Inter-Process Communication: Message passing, shared memory
- Security and Protection: Access control, authentication, encryption techniques

9. Databases:

- ER-Model and Relational Model: Entity-relationship diagrams, relational algebra
- Normalization: Functional dependencies, normalization forms
- SQL: Basic queries, joins, subqueries
- Transaction Management: ACID properties, concurrency control

- Database Design: Indexing, query optimization

10. Information Systems and Software Engineering:

- Requirement Analysis: Elicitation techniques, requirement specification
- Software Design: Modular design, architectural patterns
- Software Development Life Cycle: Waterfall model, Agile methodologies
- Software Testing: Unit testing, integration testing, regression testing
- Project Management: Scheduling, resource allocation, risk management

11. Computer Networks:

- OSI Model: Layers, protocols, encapsulation
- LAN Technologies: Ethernet, token ring, wireless LAN
- Network Protocols: TCP/IP, HTTP, FTP, DNS
- Routing and Switching: Routing algorithms, switching techniques
- Network Security: Cryptography, firewalls, intrusion detection systems