**NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL - 575025**

**DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES**

### M.Tech. (Self- Financed PG Programmes 2022-2023)

**General Instructions for the candidates who are appearing for the M.Tech. (Self-financed PG Programmes 2022-2023), Written Aptitude Test & Interview:**

1. A written aptitude test will be conducted. Syllabus for the written aptitude test is provided in annexure.

2. There is negative marking for wrong answer.

3. Time duration is 60 minutes.

4. After the written test, shortlisted candidates will be called for the interview on the next day.

5. Written Test Date and Time: JULY 12th 2022, 4:00PM – 5:00 PM.

6. Interview Date and Time: JULY 13th 2022, 9.00 AM Onwards

Sd/-

**Head of the Department**
**Mathematical and Computational Sciences**

# Annexure:

## Syllabus for the Written Aptitude Test

**Digital Logic**

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

**Computer Organization and Architecture**
Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

: **Programming and Data Structures**
Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

**Algorithms**
Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths

**Operating System**
System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

**Databases**
ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

**Computer Networks**
Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

**Probability and Statistics**
Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem

**Linear Algebra and Matrices**
Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.