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Syllabus of Entrance Test for PhD (Information Technology)

Engineering Mathematics:- Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids, Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

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

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem.

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

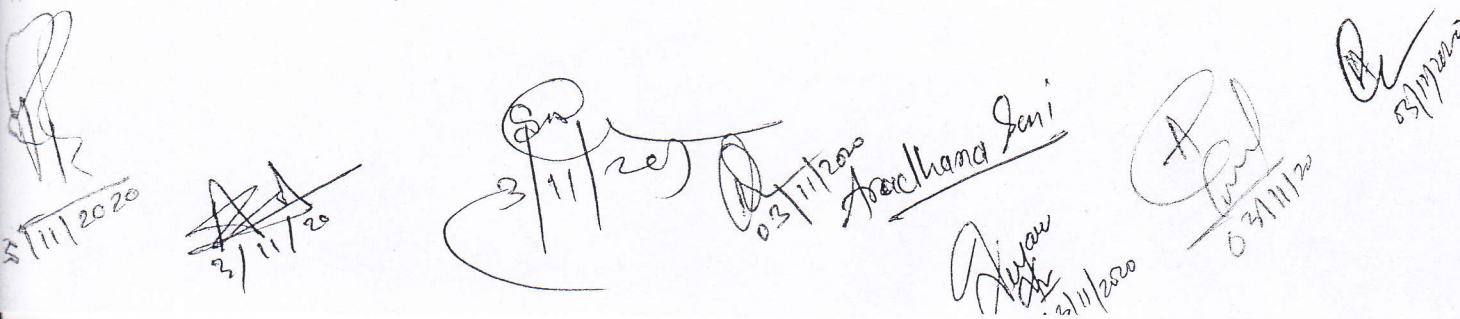
Digital Logic:- Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

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. Section 5: 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.

Theory of Computation:- Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contextfree languages, pumping lemma. Turing machines and undecidability.

Compiler Design:- Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimization, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.


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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.

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VRET-2018 Syllabus

Paper-I: Research Methodology

(Common for SoS of Engineering & Technology)

Note: Each section carries equal weightage

Section-I:

Research: Meaning. Characteristics, types, steps, methods, and ethics, Paper, article, workshop, seminar, conference and symposium

Thesis writing: Its characteristics and format

Section-II:

Mathematical reasoning: Number series, letter series, codes, relationships, classifications and data representation

Section-III:

Logical reasoning: Understanding the structure of arguments. evaluating and distinguishing deductive and inductive reasoning. verbal analogies: Word and applied analog, verbal classification. reasoning .logical diagrams, simple diagrammatic relationships. multi-diagrammatic relationships. Venn diagram and Analytical reasoning

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Section-IV:

Environment Awareness: People and environment interaction: Source of pollution. Pollutant and their impact on human life. exploitation of natural and energy resources. Natural hazards and mitigation

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Current issues of national and international importance relating to social, economic and industrial development.

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Ethics and values in engineering profession

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Section-V:

Reading comprehension: A passage to be set with objective questions

Information and Communication Technologies (ICT) based tools and their applications in Engineering such as networking, e-governance and technology based education



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Dr. V.D.K. Dean