BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE, INDIA
PhD Entrance Test – 2020
SECTION-II: COMPUTER APPLICATIONS - 50 Marks

Unit No.	Detailed Syllabus
1	**Algorithm Analysis : Asymptotic efficiency classes** Design: Greedy approach, Divide-and conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of standard Algorithms.
2	**Operating System:** Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.
3	**Databases**: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), Transactions and concurrency control.
4	**Computer Organization and Architecture**: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.
5	**Programming and Data Structures:** Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps. Object Oriented analysis, design and programming Core java and C++.
6	**Information Systems and Software Engineering**: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.
7	**Computer Networks**: ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error Control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches. **Current Trends**: Basics of Cloud Computing, Big Data, and Business intelligence.

Suggested Books:

1. "Introduction to the design and analysis of algorithms" - Anaay Levitin (pearson Education Publication)
2. Pattern Recognition Techniques and Applications- Rajjan Shinghal (Oxford University Press)
3. Operating System Concepts by Peter Baer Galvin.
4. Software Engineering: a practitioner's approach by Roger S. Pressman
5. Computer Networks, by Andrew Tanenbaum.
6. Computer Architecture. Structured Computer Organization by A. Tanenbaum.