



# Bhartiya Skill Development University

## Syllabus for Ph.D. Entrance Test

### Computing

**Set Theory & Algebra:** Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra; **Digital Logic:** Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation.

**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, 8085 microprocessors.

**Programming and Data Structures:** Programming in C/C++; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps. Algorithms: Divide & conquer, Branch & bound, Dynamic programming, Greedy techniques, NP-Hard & NP Complete.

**Operating Systems:** Processes, Threads, Inter-process communication, Concurrency, Semaphores, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

**Computer Networks:** ISO/OSI stack, LAN technologies (Ethernet), Flow and error control techniques, TCP/UDP and sockets, IP(v4), Application layer protocols, Basic concepts of hubs, switches, gateways, and routers. Wireless and mobile communication & computing, Network security – basic concepts of public key and private key cryptography, digital signature, firewalls.

**AI & Machine Learning:** AI techniques for problem solving, like Min-max; neural networks, genetic algorithms, fuzzy logic and their applications, machine learning techniques: Regression, Naïve Bayes, Clustering and Classification; Deep Learning; Python programming.

**Geo-Informatics:** Introduction to GIS, Remote Sensing, Image Processing, Utility and applications of GIS, salient features of various GIS packages, essential Components, Raster and Vector data, data storage, Data pre-processing, Format conversion, data compression and reduction techniques, Database management systems, Data manipulation and analysis, Spatial and mathematical operations on data, Area analysis, Query-based analysis, GIS



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Programming languages, Data output, Image representation and image pre-processing - Data statistics, Histogram and Scatter-plot, Atmospheric, radiometric and geometric corrections.

#### **Recommended Books**

- a) A S Tanenbaum, 'Computer Networks', 4<sup>th</sup> Ed., PHI-2003.
- b) B A Furouzon, 'Computer Networks', 5<sup>th</sup> Ed, McGraw Hill, 2012.
- c) K Garg, 'Mobile Computing-theory and Practice', Pearson Education, 2010
- d) E Rich, K Knight & B Nair, 'Artificial Intelligence', 3<sup>rd</sup> Ed., McGraw Hill, 2015.
- e) JP Mueller & L Massaron, 'Machine Learning (in Python and R) For Dummies', John Wiley, 2016.
- f) A. M. Chandra, S. K. Ghosh, 'Remote Sensing and Geographic Information System', 2<sup>nd</sup> Edition, ISBN: 978-81-8487-454-9, Narosa Publishing, Reprint 2016.