Syllabus for Entrance Test for PhD Admissions
Departments of Computer Science and Applications

Section-A Software Engineering

Software Engineering: Role of Software, Changing Nature of Software, Legacy Software, Software Myths. A Generic View of Process: Software Engineering - A Layered Technology, A Process Framework, The CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Process Technology, Product and Process. Process Models: Prescriptive Models, the Waterfall Model, Incremental Process Models, Evolutionary Models, Specialized Process Models. . Requirements Engineering: A Bridge To Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Negotiating Requirements, Validating Requirements. Building the Analysis Model: Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Flow-Oriented Modeling, Creating a Behavioral Model and unified modeling approaches. Design Engineering: Creating An Architectural & Component Level Design: Performing User Interface Design: Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies include Conventional Software, Test Strategies for Object-Oriented Software, validation testing, system testing, Art of Debugging. Testing Tactics: Software Testing Fundamentals, Black-Box and White-Box Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black- Box Testing, Object-Oriented Testing Methods, Testing Methods Applicable at the Class Level, Interclass Test Case Design, Testing for Specialized Environments, Architectures, and Applications, Testing Patterns.

Section-B Database Management and Systems

Database Fundamentals : basics of database systems, including data models (e.g., relational, hierarchical, network), database design, query languages (e.g., SQL), and transaction processing. Data Modeling: entity-relationship (ER) modeling, object-oriented modeling, and semantic data modeling. Query Processing and Optimization: query parsing, query optimization algorithms, and query execution. Database Administration: user management, security, backup and recovery, and performance tuning. parallel databases, data warehousing, data mining, and big data.

Section-C Computer Networks

Reference models, Physical Layer, Multiple access protocols, Ethernet, Routing algorithms, Congestion control algorithms, Quality of service, Internet working, Network layer in the Internet, Transport service, Elements of transport protocols, Internet transport protocols: TCP & UDP, Domain Name System

Section-D Operating Systems

System Software and Operating Systems: Understanding the role of OS within the system software hierarchy, its core functionalities like process management, memory management, device management, file management, and security. Computer Architecture: Grasping the underlying hardware architecture, including memory hierarchy (cache, main memory, secondary storage), CPU organization, and I/O systems. Concurrent Processes: Mechanisms for handling multiple processes executing concurrently, including synchronization primitives (semaphores, monitors), inter-process communication (pipes, message queues), and scheduling algorithms.