DEPARTMENT OF COMPUTER SCIENCE
ALAGAPPA UNIVERSITY, KARAIKUDI 630 003

SYLLABUS FOR
Ph.D. PRE-REGISTRATION QUALIFYING ENTRANCE EXAM IN COMPUTER SCIENCE

UNIT I:
Computer Architecture Number Systems: Binary, Octal. Decimal and Hex systems - Conversions - Complements - Fundamental concepts of Boolean Algebra of expressions - Combinational Circuit Design - Sequential Circuit Design-Hard programmed processor design - Memory organization - General Register organization - Instruction formats-Addressing modes - Data transfer and manipulation control-Interfacing peripheral devices - Interrupts.

Programming Languages: Algorithm-flowchart-C Language-Control Statements - Structures union and files-pointers in C- C programming programming concepts - Classes and objects Instantiation - Overloading Polymorphism - Object oriented programming and features in C++ and Java program

Data Structures: Simple and abstract data types and data structures stacks-queues- trees balanced trees Graphs classes and objects complexity of algorithm conquer greedy dynamic programming searching and traversal techniques- backtracking Branch & Bound-NP Hard and NP complete problems.

UNIT II:

Operating Systems: Structures - Types - Functions-system calls- Process - CPU scheduling Process synchronization-deadlocks - memory management - file system interface l/o systems assembles. Distributed systems communication –synchronization –deadlocks -file systems-shared memory- Unix Utilities - Problem solving approaches in Unix - Unix Internals - Unix process- Threads and signals and Inter Process Communication.

Software Engineering: Software characteristics, quality factors, Software development phases - Process models: Waterfall, Incremental, spiral, RAD models The Unified process. Software requirement analysis-Software requirement specification document - Software Design concepts and models-design process-Object oriented design process-User Interface design process - Software testing strategies-White box and block box methods - Testing methods: Unit, Integration, and System Validation

Graphics and Image processing: Raster Sean Graphics-2D & 3D Transformations-Viewing-Projection Variable surface detection-Shading-Animation. Digital Image processing fundamentals Transforms-Restoration - Image enhancement techniques- Image Segmentation-Image Compression Morphological Image processing.

Internet of Things (IoT): Hardware- SoC sensors-device drivers- loT standards - NFC, RFID, Zigbee - loT reference Model-loT Strategic Research and Innovation Directions loT Applications -Future Internet Technologies

UNIT III:

Fundamentals of Computer Networks: Computer Networks- Applications-Line configuration-Topology- Transmission Modes- Types of Networks-Network reference models: OSU/ISO, TCP-Transmission media Wireless transmission - Telephone networks-local, trunks, multiplexing. ISDN-ATM-Data Link Layer-Error detection and correction-Flow and error control - Sliding Window Protocol Stop wait protocol Multiple Access Protocols ALOHA CSMA CSMA/CD-CSMA/CA-Network Layer-Switching concept-routing-congestion control-IP- ICMP-Transport Layer-Services and Applications-UDP-TCP-FTP-SNMP

Network Security: Fundamentals of Network security Security attacks Services and Mechanisms-Symmetric and Asymmetric key cryptography - Digital signatures-Web and mail security

Mobile Communications: Medium Access Control-SDMA-FDMA-TDMA-CDMA-Tele communications GSM-Broadcast Systems Overview Digital Audio Broadcasting-Digital Video Broadcasting, Wireless communications - Bluetooth-Wireless ATM Working Group Services- Reference Model-Function Radio Access Layer-Handover Location Management-Access Point Control Protocol

Cloud Computing: Developing Cloud Services-Fundamentals of Cloud Services – Cloud Storage Provider Types of Clouds-Service Oriented Architecture and the Cloud-Managing the Cloud Environment-Managing and Securing Cloud Services - Cloud Security Challenges and Risks Cloud Virtualization

UNIT IV:

Introduction to Compilers: Compiler Structure - Compiler construction phases - Lexical analysis - Regular expressions and regular languages Deterministic Finite State Automata Non deterministic Finite State Automata - Grammars and languages - Context free grammars - parsing and parse trees - Bottom up parsers: Shift reduce, operator precedence and LR - Top down Parsers: Recursive descent parser - Predictive parser - Intermediate code generation-Code generation and optimization.

AI and Expert Systems: Automated Reasoning with propositional logic and Predicate logic - Inference theory and Predicate Calculus, State space representation of problems- bounding functions - breadth first depth first A. A. AO etc. Performance comparison of various search techniques Frames-scripts-Semantic nets - Production systems - Procedural representations- Prolog programming. Components of an expert system-Knowledge representation and Acquisition techniques-Building expert system - Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Prgamatics.

Neural Networks and Fuzzy Systems: Perception model - Linear separability and XOR problem- two and three layered neural nets-Back propagation - Convergence- Hopfield nets - Neural net learning-Applications - Definition of a Fuzzy set-Fuzzy relations - Fuzzy functions-Measures Reasoning-Applications of Fuzzy systems - Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

Discrete Structures; Sets, Relations, Functions - Pigeonhole Principle- Finite Automata Pushdown Automata- Non-Deterministic Automata- Languages - Grammars Graphs Groups

UNIT V

Database Management Systems: Database System - Data views - Data independence - Data Abstraction-Data Models-ER Model-Relational Model-Database languages: DDL-DML Database Administrator - Database System Structure - ER diagram - Normalization - SQL Basics-operators and queries Nested Queries Commands. Query optimization and evaluation Database design Concurrency control and recovery - Storing and Indexing Distributed data base design-Distributed Transaction Management-Reliability.

Data mining and warehousing: Data mining concepts-Functionalities, Classification of Data Mining Systems- Major Issues on Data mining Data mining Query language - Association Rules in large Data mining KDD Process Classification and Prediction - Information retrieval-Dimensional Modelling of Data - Pattern Matching-Clustering Issues - impacts and approaches-Clustering algorithms K-means and C-means-Data warehousing and its basic concepts

Big Data Analytics: Information Retrieval and Data Mining-Big Data Essentials - Big Data and its importance, Four Vs Machine Learning - Big Data Analytics - Data Visualization- Apache Hadoop & Hadoop EcoSystem Data Serialization-Hive Architecture and Installation - HiveQL

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