SCHOOL OF COMPUTATIONAL SCIENCE / Ph.D. COMPUTER APPLICATION

GNA UNIVERSITY

SYLLABUS FOR PHD ENTRANCE TEST IN COMPUTER APPLICATION

Section 1 : Business Research Methodology

Nature and Scope of Research Methodology Problem Formulation and Statement of Research Objectives; Value and Cost of Information; Bayesian Decision Theory; Research Process;Research Designs - Exploratory, Descriptive and Experimental; Methods of Data CollectionObservational and Survey Methods; Questionnaire and Interviews. Attitude Measurement Techniques; Administration of Surveys; Sample Design; Selecting an Appropriate Statistical echnique. Field Work and Tabulation of Data; Analysis of Data; Use of SPSS and other Statistical Software Packages Advanced Techniques for Data Analysis — ANOVA. Discriminate Analysis, Factor Analysis, Conjoin: Analysis and Clustering Methods.

Section 2 : E – Commerce

Introduction to Electronic Commerce: Framework, applications; network infrastructure (Including Internet). Internet commercialization. Electronic payment system, inter-organizational commerce & intra—organizational commerce, EDI, value-added network, digital library; Security, advertising & marketing on the internet, introduction to e CR.M. Consumer search & resource discovery, computer based education & training, digital copyrights. Fundamental of mobile computation and wireless computation, multimedia & digits] video, software agents; characteristics & properties, technology, tote—script, agent language, applets & browser.

Section 3 : Theory of Computation

Models of computation-Finite Automata, Pushdown Automata, Nondeterministic and NFA, DPDA and PDAs and Languages accepted by these structures. Grammars, Languages, Non-computability and Examples of non-computable problems.

Section 4 : Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs. File structures: Fields, Records and files.Sequential, Direct, index-sequential and relative files. Hashing, Inverted lists and multi-lists, Algorithms and Analysis: Sorting and searching algorithms. Analysis of algorithms, Interpolation and Binary search, Asymptotic notations – big ohm, mega and theta, Average case analysis of simple programs like finding of a maximum of n elements. Recursion and its systematic removal. Quick sortnon-recursive implementation with minimal stack storage. Design of Algorithms (Divide and Conquer, Greedy method, Dynamic programming, Back tracking, Branch and

Bound). Lower bound theory, nondeterministic algorithm,-non-deterministic programming constructs. NP-hard and NP-complete problems.

Section 5 : Computer Organization and Architecture

Boolean algebra and Minimization of Boolean functions, Combinational Circuit Design, Sequential Circuit Design. Hardwired and Micro programmed processor design, Instruction formats, Addressing modes, memory types and organizations, Interfacing peripheral devices, Interrupts. Microprocessor architecture, Instruction set and Programming (8085, P-III/P-IV).

Section 6 : Microprocessor applications

Computer Networks & Internet : Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls. Operating Systems: Memory Management : Virtual memory, paging, fragmentation. Concurrent Processing : Mutual exclusion, Critical regions, Semaphores. Scheduling: CPU scheduling, I/O scheduling, resource scheduling, Deadlock and scheduling algorithms. Banker's algorithm for deadlock handling.

Section 7 : Operating Systems

Agreement Protocols for handling Processor Failures
Comparative Performance Analysis
Distributed Mutual Exclusion
Distributed Operating Systems
Local and Global states
Process Deadlocks
Resource Models
Synchronization Mechanisms
Coordination of Processes and related Algorithms
Failure Handling and Recovery Mechanisms
Multiprocessor Operating Systems and related Thread Handlings
Token and Non-token based Algorithms

Section 8 : Software Engineering

Team Software Process
Systems Modeling Language
Requirement and feasibility analysis
Process Models- Iterative
Planning and managing the project
Personal Software Process
Domain specific modeling
Software architecture and design patterns
Software reliability and Advanced testing techniques
Aspect oriented programming