KARNATAKA STATE OPEN UNIVERSITY
Mukthagangothri, Mysuru - 570 006

SYLLABUS FOR Ph.D. COMMON ENTRANCE TEST

PAPER -1: RESEARCH METHODOLOGY
COMPUTER SCIENCE DEPARTMENT

Unit 1: Research Methodology

Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Unit 2: Defining the Research Problem and Reviewing the Literature

Research Formulation – Defining and formulating the research problem - Selecting theproblem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis.

Reference Books:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg, New Age International 4th Edition, 2018
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.

PAPER -2: Cognate Subject- Computer Science

Unit 1. Discrete Structures

Sets, Relations, Functions, Pigeonhole Principle, Inclusion-Exclusion Principle. Equivalence

and partial Orderings, Elementary Counting Techniques Probability: Elements of probability, Bayes theorem. Computability: Models of computation-Finite Automata, Pushdown Automata, Non- deterministic and NFA, DPDA and PDAs and Languages accepted by these structures. Grammars, Languages, Non-computability and Examples of non-computable problems. Graph: Definition, walks, paths, trails, connected graphs, regular and bipartite graphs, cycles and circuits. Tree and rooted tree. Spanning trees, Eccentricity of a vertex radius and diameter of a graph. Central graphs. Centre(s) of a tree.

Unit 2 Computer Organization and Architecture

Boolean algebra and Minimization of Boolean functions, Flip-flops-types, Race condition and comparison. Design of combinational and sequential circuits. Representation of Integers: Octal, Hex, Decimal, and Binary. 2's complement and 1's complement arithmetic. Floating point representation. 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). Microprocessor applications.

Unit 3. Programming in C and C++

Programming language concepts, paradigms and models. Programming in C: Elements of C-Tokens, identifiers, data types, operators in C. Control structures in C. Sequence, Selection and iterations (s). Structured data types in C-arrays, struct, union, String and pointers. I/O statements, User defined and built in functions, Parameter passing.C++ Programming : Elements of C++-Tokens, identifiers, Variables and constants. Data types. Operators, Control statements, Functions parameter passing, Class and objects.

Unit 4. Relational Database Design and SQL

Database, E-R diagram, Relational model, Relational Algebra, Relational Calculus, Relational design, Normalization, 1NF, 2NF, 3NF, BCNF and 4NF.SQL: Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL) commands. Database objects like – Views, indexes, sequences, synonyms, data dictionary.

Unit 5. Computer Networks

Network fundamentals: Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Topologies, Networking

Devices. The OSI model, TCP/IP model. Protocols for –(i) Data link layer, (ii) Network layer, and (iii) Transport layer, TCP/IP protocols, Networks security, Network administration.

Unit 6. Operating Systems (with case study of Unix)

Main features and functions of operating systems. Multiprogramming and Multiprocessing and multi-tasking. 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. The Unix System: File system, process management, bourne shell, shell variables, command line programming. Filters and Commands: pr, head, tail, cut, paste, sort, uniq, tr, join, grap, egrap, fgrep, sed, awk, etc.System Calls (like) : Creat, open, close read write, iseek, link, unlink, stat, fstat, umask, chmod, exec, fork, wait, system.

Unit 7. Software Engineering and Computer Graphics

System Development Life Cycle (SDLC) : Steps, Waterfall model, Prototypes, Spiral model. Software Metrics : Software Project Management.Software Design : System design, detailed design, function oriented design, object oriented design, user interface design, Design level metrics.Coding and Testing: Testing Level Metrics. Software quality and reliability. Clean room approach, Software reengineering.Concepts: Display systems, Storage Devices, Input devices, Output devices, 2D transformation, Windows and view port, Elements of 3D graphics, drawing, shading, clipping, drawing lines and shapes and algorithms, B-Spline curve, Bezier curves, Animation Graphics Standard, Fractals.

Unit 8. Algorithmics

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. Quicksort-non-recursive implementation with minimal stack storage. Design of Algorithms (Divide and Conquer, Greedy method, Dynamic programming, Back tracking, Branch and Bound).

References:

1. I.Erns Horowitz and Sartaj Salmi, Fundamentals of Data Structures in C, Universities Press
2. Ralph P, Grimaldi: Discrete and Combinatorial Mathematics, Pearson Education
3. Ian Sommerville: Software Engineering,, Pearson Education
4. Carl Hamacher, honk° Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata

India.

7. Forouzan, A. B. (2007). Data communications & networking (sie). Tata McGraw-Hill Education.
8. Fundamentals of Database Systems, Ram/. Elmasri and Shamkant II, Navathe,, Pearson
9. Balagurusamy, E. (2001). Object-Oriented Programming with C++, 7e. McGraw-Hill Education.

Bhavya. D

[BOS Chairman]