BHARATI VIDYAPEETH DEEMED UNIVERSITY

FACULTY OF ENGINEERING AND TECHNOLOGY

Ph. D. Entrance Test Syllabus

SECTION-I: Research Methodology

∗The syllabus of Research Methodology will be common for all the subject except Law

Syllabus	
Introduction to Research : The concept of research, characteristics of good research, Application of Research, Meaning and sources of Research problem, characteristics of good Research problem, Research process, outcomes, application of Research, Meaning and types of Research hypothesis, Importance of Review of Literature, Organizing the Review of Literature.	
Types of Research : Types of research, pure (basic, fundamental) and applied research, qualitative and quantitative.	
Research Design : Meaning, need, types of research design – Exploratory, Descriptive, Casual research Design, Components of research design, and Features of good Research design. Experiments, surveys and case study Research design.	
Sampling, Data Collection and analysis : Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling, classification and tabulation of data, graphical representation of data, graphs and charts – Histograms, frequency polygon and frequency curves, bell shaped curve and its properties. Statistical Methods for Data Analysis : Applications of Statistics in Research, measures of central tendency and dispersion	
Research Report : Research report and its structure, journal articles – Components of journal article. Explanation of various components. Structure of an abstract and keywords. Thesis and dissertations . components of thesis and dissertations. Referencing styles and bibliography.	
Ethics in Research - Plagiarism - Definition, different forms, consequences, unintentional plagiarism, copyright infringement, collaborative work. Qualities of good Researcher.	
ICT Tools for Research : Role of computers in research, maintenance of data using	

software such as Mendeley, Endnote, Tabulation and graphical presentation of research data and software tools. **Web search** : Introduction to Internet, use of Internet and WWW, using search engines and advanced search tools.	

RECOMMENDED BOOKS

1	Donald Cooper and PS Schindler (2009)	Business Research Methods, 9th edition, Tata McGraw Hill.
2	Kothari C. R	Research Methodology
3	Uma Sekaran (2010)	Research Methods for Business, 4th edition, Wiley.
4	Ranjit Kumar (2009)	Research Methodology, 2nd edition, Pearson Education
5	Naresh Malhotra and S Dash (2009)	Marketing Research, 5th edition, Pearson Prentice Hall.
6	Michael V. P	Research Methodology.
7	Fred N. Kerlinger :	Foundations of Behavioral Research.

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Section II -Specific Subject: Computer Engineering

	Topics covered
UNIT-I	Data Structure & Algorithm - Data structures - Stacks, queues, trees, graphs, binary search trees, heaps and priority queues, hash tables, Searching and sorting - Linear and binary search. Bubble sort, insertion sort, selection sort, merge sort, quick sort, heap sort, counting sort, Algorithm design techniques - Divide-and-conquer, greedy, and dynamic programming algorithms. Graph algorithms - Preorder, inorder and postorder traversal of trees, BFS and DFS, topological sort. Minimum spanning trees (Kruskal's and Prim's algorithms), Shortest path (Dijkstra and Floyd-Warshal algorithms). Representation of graphs.
UNIT-II	Regular Expressions and Languages, Deterministic and Non deterministic Finite Automata - DFAs, NFAs and their equivalence with Regular Grammars and Regular Expressions, Converting NFA to DFA, DFAs, NFAs and their equivalence with Regular Grammars and Regular Expressions, Converting NFA to DFA. Grammar- Context Free Grammar, sentential form, parse tree, inference, derivation, parse tree, ambiguity in grammar and language, Automata Regular grammar- Definition, left linear, right linear grammar, FA to RG and RG to FA, Application of grammar, Turing machines (TMs): TM Model and conventions, Push Down Automata.
UNIT-III	Assemblers, Macro Processor: Loaders and Linkers, Compile and Go, General Loader Scheme, Absolute Loader Scheme, Phase Structure of Compiler, Lexical Analyzer: The Role of the Lexical Analyzer, Role of Parsers, Top Down Parsers, Recursive Descent Parser, Predictive Parser, LL(K) Parsers, Bottom Up Parsers, Semantic Analysis Overview of Operating System, Process, Thread, Scheduling, Types of Scheduling, Scheduling Algorithms, Concurrency: Mutual Exclusion and Synchronization, Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, Memory Management & Virtual Memory.
UNIT-IV	Network Models, Layers in the OSI Model, TCP/IP Protocol suite, Layered Architecture & its protocol, Wireless WANs: Cellular Telephone and Satellite Networks, Wireless Sensor Network, Wireless LAN, PAN and MAN, Ad-Hoc Networks and Sensor Networks. Network Security, Cryptography, Symmetric Key and Public Key Algorithms., Hash Algorithms, Key Management: Generations, Distribution, Updation, Digital Certificate, Digital Signature, PKI.
UNIT-V	Relational Databases – Architecture – Query Language – E- R Modeling – Normalization – Query Processing, Transaction Processing – Integrity and Security – Multimedia Data Structures – Queries for Multimedia Databases, Parallel Databases, Distributed Databases, Joins, SQL/PL-SQL, Data mining, OLAP, OLTP Software Engineering Process, Agile Development Process, Requirement Engineering,

	Requirement analysis, Agile Requirement, Software Design Instruction set architecture- instruction types, instruction formats, addressing modes. Control organization of a CPU, control and data paths, and register-transfer level specifications. Memory system - Concept of memory hierarchy, cache memory, cache performance, cache-main memory mapping. Input-output systems - Programmed I/O, Interrupt-driven I/O, polling and vectored interrupt, basic concept of DMA transfer.

Text Books/References:

1.	Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in C++‖, Wiley publication
2.	John C. martin, "Introduction to Language and Theory of Computation", TMH, Third Edition
3.	William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition,
4.	D.M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw-Hill
5.	Andrew S. Tanenbaum, "Computer Networks", PHI, Fifth Edition
6.	Pressman, R. (2010), "Software Engineering: A Practitioner's Approach",7th Ed. Singapore: McGraw Hill.
7.	Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 6th Edition, McGraw Hill
8.	Willaim Stallings, "Computer Security: Principles and Practices", Pearson Ed.