TEERTHANKER MAHAVEER UNIVERSITY

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Delhi Road, Moradabad (U.P.)

SYLLABUS FOR RESEARCH APTITUDE TEST IN COMPUTER APPLICATIONS

The syllabus for Research Aptitude Test (RAT) in Computer Applications is divided in two parts viz. Part A and Part B as described below:

PART – A

Part A of the RAT shall be designed to assess the research skills/aptitude of the candidate consisting of questions from the following areas:

1. **Research Methodology:** meaning, characteristics, and ethical issues in research; types of research; research methods.

2. **Logical Reasoning:** arguments, deductive and inductive research; logical and Venn diagram; inferences; analogies.

3. **Data Interpretation:** interpretation of data; mapping and analysis of data, tools for data analysis; quantitative and qualitative research.

4. **General Awareness about Basic Science:** basic science up to the level of SSC.

5. **Mathematical Reasoning:** number series, letter series, codes; relationships, classification.

PART – B

Part-B of RAT is designed to assess the subject specific knowledge of the candidate covering the syllabus given as below:

Operating System: Operating system- definition, functions, multi-programmed and batch systems, multitasking and distributed systems; files- attributes, operations, file access methods, deadlock and its characterization; types of CPU scheduling.

Software Engineering: Evolving role of software, software engineering problems, software development life cycle and models, software requirement specification, software architecture, software testing strategies, software project management, software configuration management, software reliability and quality assurance.

Object Oriented Programming (OOP): Introduction, concepts, class and its scope with access specification, constructors, destructors, friend function and friend classes, dynamic memory allocation, static class members, container classes and integrators, function overloading, virtual functions, abstract base classes and concrete classes, polymorphism, new classes and dynamic binding, virtual destructors, dynamic binding, files and streams,

stream input/output classes and objects, function templates, class template, class templates and non-type parameters, basics of exception handling.

Database Management System: Transaction and schedules, concurrent execution of transaction, conflict and view serializability, testing for serializability, concepts in recoverable and cascadeless schedules. lock based protocols, time stamp based protocols, multiple granularity and multiversion techniques, enforcing serializablity by locks, functional dependencies and normalisation, distributed transactions management, data distribution, fragmentation and replication techniques, distributed commit, issues of recovery and atomicity in distributed databases, traditional recovery techniques, log based recovery, recovery with concurrent transactions.

Data Structures through 'C' Language: Algorithm complexity and time-space trade-off, stack- implementation, operations, push and pop, linked representation, conversion of infix to prefix and postfix expressions; queue- linked representation and implementation, operations, create, add, delete, full and empty, circular queue, deque, priority queue; linked list- implementation of singly linked lists, two-way header list, traversing and searching of linked list, overflow and underflow, insertion and deletion; tree- binary trees and binary search trees and its algebraic expressions; Huffman algorithm, searching and sorting in data structure, graphs- types, representations, adjacency matrices, traversal, minimum cost spanning trees algorithm.

Computer Networks: ISO/OSI stack, LAN technologies (Ethernet, Token ring), flow and error control, techniques, routing algorithms, congestion control, TCP/UDP and sockets, IP(V4), application layer protocols (ICMP, DNS, SMTP, POP, FTP, HTTP); basic concepts of hubs, switches, gateways, and routers; network security, concepts of public key and private key cryptography, digital signature, firewalls.