

**SYLLABUS FOR COMPUTER BASED RECRUITMENT TEST (CBRT)**  
**FOR THE POST OF ASSISTANT PROFESSORS IN GOVERNMENT COLLEGE**  
**(COMPUTER SCIENCE)**  
**UNDER**  
**DIRECTORATE OF HIGHER EDUCATION**  
**(Advt No. 2 Year 2020 , Advt No. 5 Year 2020 and Advt No. 06 Year 2022)**

- I. General English including Grammar - 05 marks**
- II. General Knowledge, Current Affairs and Events of National and International Importance - 10 marks**
- III. Logical Reasoning and Analytical Ability - 10 marks**
- IV. Core: - 50 marks**
- 1. Computer Organization, Operating Systems and Systems Software**  
Boolean Algebra and Logic Gates, Simplification of Boolean Function, Sequential Logic, Overview of Register Transfer and Microoperations, Basic Computer Organization and Design , Programming the Basic Computer, Central Processing Unit , Pipeline Processing, Main functions of operating systems, Multi Programming, multiprocessing, and multitasking. Memory Management, Virtual memory, Concurrent Processing, Deadlocks, Scheduling: CPU scheduling, I/O scheduling, Resource scheduling, Linux/UNIX Concepts, commands and system calls  
Assembly language fundamentals , Assemblers-2-pass and single-pass. Macros and macroprocessors. Loading, linking, relocation, program relocatability. Linkage editing. Text editors. Programming Environments. Debuggers and program generators.
  - 2. Computer Arithmetic:**  
Propositional Logic, Predicate Logic, Well-formed formulae (WFF), Satisfiability and Tautology. Logic Families: TTL, ECL and C-MOS gates. 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.
  - 3. Discrete Structures:**  
Sets, Relations, Functions, Pigeonhole Principle, Inclusion-Exclusion Principle, Equivalence and Partial Orderings, Elementary Counting Techniques, Probability. Measure (s) for information and Mutual information. Computability: Models of computation-Finite Automata, Pushdown Automata, Non-determinism and NFA, DPDA and PDAs and Languages accepted by these structures. Grammars, Languages, Non-computability and Examples of non-computable problems. Graph concepts and connected graphs, regular and bipartite graphs, cycles and circuits. Tree and rooted tree. Spanning trees. Hamiltonian and Eulerian graphs, Planar graphs. Groups: Finite fields and Error correcting/detecting codes.
  - 4. Programming in C/ C++ and Data Structures:**  
Elements of C-Tokens, identifiers, data types in C. Control structures in C. Sequence, selection and iteration, Structured data types in C-arrays, struct, union, string, and pointers. O-O Programming Concepts: Class, object, instantiation. Inheritance, polymorphism and overloading. C++ Programming: Elements of C++ Tokens, identifiers. Variables and constants, Datatypes, Operators, Control statements. Functions parameter passing. Class and objects. Constructors and destructors. Overloading, Inheritance, Templates, Exception handling. Data, Information, Definition of data structure. Arrays, stacks, queues, linked lists, trees, graphs, priority queues and heaps. File Structures: Fields, records and files. Sequential, direct, index-sequential and relative files. Hashing, inverted lists and multi-lists. B trees and B+ trees.

**5. Relational Database Management and SQL:**

E-R diagrams and their transformation to relational design, Normalization upto 4NF. SQL –DDL/DML/DCL. Database objects ,Transactions and Concurrency Control, Recovery,Storage and Indexing, Query Optimization Techniques

**6. Software Engineering:**

System Development Life Cycle (SDLC): Steps, Water fall 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.

**7. Computer Networks:**

Network fundamentals –LAN,MAN,WAN, Wireless Networks, Inter Networks., Topologies, The OSI model, TCP/IP model, Data Communication and Transmission media, Communication satellites, geosynchronous and low-orbit. Internetworking: Switch/Hub, Bridge, Router, Gateways, Concatenated virtual circuits, Tunnelling, Fragmentation, Firewalls. Routing: Virtual circuits and datagrams. Routing algorithms. Congestion control. Network Security: Cryptography-public key, secret key. Domain Name System (DNS) -Electronic Mail and Worldwide Web (WWW). The DNS, Resource Records, Name servers. E-mail-architecture and Services.

**8. Current Trends and Technologies:**

General information on Parallel Computing, Mobile Computing,E-technologies, Data Mining

**Note:**

**Duration for C.B.R.T : 90 Minutes**

**Maximum Marks for C.B.R.T : 75 Marks**