**RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**

# SCHEME & SYLLABUS FOR THE POST OF ASSISTANT CONSERVATOR FOREST & FOREST RANGE OFFICER GRADE I$^{st}$ COMPETITIVE EXAMINATION, 2018 FOREST DEPARTMENT

## OPTIONAL SUBJECT - COMPUTER APPLICATION/SCIENCE

### 1. Computer Organization and Architecture

Von Neumann Architecture, Number representation and Computer arithmetic, Logic design of Digital Systems, Fundamental and advanced concepts of Logic Designs, Boolean Algebra & functions, Designing and synthesis of combinational and Sequential circuits, minimization techniques, Memory and CPU organization, DMA, I/O Interface, basic architecture of Indian super computer 'PARAM'.

### 2. Computer Programming

Algorithms and Flowcharts: Problem analysis, algorithms, data assignments, flowcharts, stepwise refining, sequencing, alternation and Looping, programming languages.

C language: Representation of integers, real, characters, data types, constants, variable, arithmetic expression, assignments, conditional statement, control statements, simple I/O. Arrays, functions and procedures, parameter passing, Pointers.

### 3. Object Oriented Programming Language

Objects and Classes, Data encapsulation, Abstraction, Polymorphism, Inheritance, Access specifier, Abstract Data Types. Friend function, Operator overloading, nested class, Interfaces and Packages, Standard Java packages, Creating & using a package, adding a class to a package. Exception handling, multithreading, Applet Vs Application.

### 4. Data Structures & Algorithms

Stacks & queues, their array implementations, recursion stacks and recursive procedures. Linked list, Trees, Binary search tress, Tree and graph traversal, Spanning trees, Shortest paths, Hashing, Sorting, Searching , Merging, introduction to algorithm analysis for time and space.

## 5. Computer Networks

Analog and digital Transmission, Transmission media, Asynchronous and Synchronous transmission, Protocol design issues, LAN, WAN, MAN, LAN technologies (Ethernet and Token Ring), Networking devices, Network topologies, Network reference model: OSI Model, TCP/IP Model, Error control, Flow Control, Data Link Protocols (HDLC, PPP). Multiplexing, Switching, Routing, Routing Algorithms, Bridging, TCP/UDP and Sockets, IPv4/IPv6, DNS, Introduction of cyber crimes and cyber laws.

## 6. Operating Systems

Types and functions of OS, Operating System Structures: System components, Operating system services, System calls, Systems programs, System structure, Virtual machines, Processes, Threads, Inter Process Communication, Concurrency, Synchronization, Deadlock, CPU Scheduling, Memory Management and Virtual memory, File system, I/O System, Paging and Demand Paging, Security and Protection.

## 7. Data Base Management Systems

Basic database concepts, Entity Relationship modelling, Relational data model and algebra, RDBMS; Database design, functional dependencies and normal forms (1NF, 2NF, 3NF, 4NF & BCNF), Structured query languages (SQL), File Structure (Sequential files, indexing), Transaction and Concurrency Control, Security, Privacy and authentication aspects in database.

## 8. Web Technology

Introduction to HTML, Tags and Attributes, Text Styles and Text Arrangements, Color and Background of Web Pages, Lists and their Types, Attributes of Image Tag. Hypertext, Hyperlink and Hypermedia, Links, Anchors and URLs, concept of navigation, Different Section of a Page and Graphics, Footnote and e-Mailing, Creating Table, Frame, Form and Style Sheet. Dynamic HTML, Document Object Model, Features of DHTML, CSSP (Cascading Style Sheet Positioning) and JSSS (JavaScript assisted Style Sheet) , Front Page Basics , Web Terminologies, FTP, HTTP and WPP, Features, Front Page Views, Relating Front Page to DHTML.

## 9. Software Engineering

Software development Life Cycle and different SWDLC models, Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, planning and managing the project, Risk analysis, design, coding, testing, implementation, maintenance, Software verification and validation, CASE tools.

## 10. Numerical Methods

Computer arithmetic and errors, Floating point arithmetic and error estimates, Implication of precision, Illustrations of errors due to round-off, Solution of non-linear equations : Bisection, Fixed point iteration, Newton-Raphson method, Aitkins process, rate of convergence. zeros of polynomials, real & complex.
Interpolation and Polynomial Approximation, Numerical Differentiation and Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations, Approximation Theory.

Note :- **Pattern of Question Paper**

1. **Objective type paper**
2. **Maximum Marks : 200**
3. **Number of Questions : 120**
4. **Duration of Paper : Three Hours**
5. **All questions carry equal marks.**
6. **There will be Negative Marking.**