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Computer Science Syllabus for Uttarakhand State  
Civil Services Main Exam-2011

## COMPUTER SCIENCE

### PAPER-I

**Algorithms and Flowcharts:** Problem analysis, flow chart, the concept and properties of algorithms, elementary algorithm development, algorithms evolving decision and loops.

**Computer Fundamentals:** Simple model of Computer, Characteristics and generation of Computers, Binary numbers. Codes and arithmetic: binary, octal, hexadecimal number systems and their conversion from one number system to another number system.

**Data Representation:** Data types, fixed and floating point representation, Description of I/O units, memory organization: Ram, Rom, Cache memory, serial and random access memory, concept of operating systems, computer communications and networking.

### Computer Based Numerical Methods & Fortran Programming

**Numerical Methods:** Errors in numerical calculations: absolute, relative and percentage errors. A general error formula, errors in series approximation. Floating and normalised floating point representation of numbers. Simultaneous linear equations: matrix inversion, Gauss-Jordan and Gauss elimination method with pivoting and without pivoting, Ill conditioned equations refinement of solutions.

**Numerical Integration:** Gaussian General Quadrature formula, Trapezoidal and Simpson's rule. Romberg integration.

Numerical solutions of algebraic equations (in one known quantity only): Bisection method, Newton Raphson method and iterative method.

**Solution of Ordinary Differential Equations:** Euler's method and Runge-Kutta methods.

**Fortran Programming:** Programming preliminaries, constants and variables, arithmetic expression, I/O statements, control statements, Do-statements, subscripted variable, formats in FORTRAN, functions and subroutines.

### Logical Organisation of Computer:

**Basic Logic Design:** Truth tables, truth functions, Boolean algebra, combinational circuit design with AND, OR, NOT, NAND, NOR, XOR gates and multiplexers, flip-flops, shift registers and counters, simple arithmetic and logic circuits.

**CPU Architecture:** Instruction format addressing modes, Direct, Indirect, Immediate, Relative, Indexed modes. Addressing formats: Zero, Single, Double, Register etc. Instruction selection, Instruction execution, Fetch-Execute cycle, speed mismatch between CPU and memory and methods of alleviating it. I/O Architecture: Properties of simple I/O devices and their controllers. Transfer of information between I/O devices, CPU and memory, alleviating speed mismatch between I/O units and memory, DMA control. I/O channel and peripheral processors.

**C Programming:** Variables, expression, assignments and data types, preprocessor. Use of printf and scanf, branchwise statements, flow of controls, arrays, strings, pointers, scope and storage classes, function, call by Values and call by references, Structures, unions and file handling.

### Data and File Structures:

**Arrays, Records and Stacks:** The notation of data structures, primitive and composite data types, ordered lists and polynomials, representation of arrays, records and stacks, evaluation of expressions using stacks.

**Lists, Queue and Trees:** Single and doubly linked lists, queues, circular queues, basic terminology of trees, binary trees representation and traversal.

## PAPER-II

**Operating System:** Operating system as resource manager, operating system series and classification: single user, multi, interactive and real time.

**Processor Management:** Process and task concept, timesharing and batch processing, process control blocks, semaphores, CPU scheduling, Dead locks, avoidance, detection, prevention and recovery of deadlocks.

**Memory Management:** Resident monitor, Partition fixed and variable, Virtual memory. Paging, demand paging, segmentation page replacement algorithms, hierarchy of memory type.

**Data Communication and Net Works:**

**Communications:** Concepts of data transmission, Signal encoding, modulation methods, synchronization, multiplexing and concentration, coding methods, cryptography.

**Networks:** Design and goals of Networking. Communication system architecture OSI reference model topology types, selections, design, local area networks (LAN), CSMA CD, token bus, token ring techniques, link level control (LLC) protocol, medium access control (MAC) protocol wide area networks (WAN), Concept in network layer, packets switched networks, switching techniques routing methods.

**Object-Oriented Programming in C++**

**Paradigms and Metaphors:** Active data, classes, Encapsulation and inheritance, Types of object oriented system.

**OOPS Tools:** Development of programming language, C++ declaration and constants expression and statements, function, classes, operator and function overloading constructor and destructor, derived class, files and streams, graphics in C++. Virtual functions, Window Programming through Visual C++.

**Microprocessors and Interfacing:** Micro computers and microprocessors, 8-bit microprocessors Instructions and timings; 8085 instruction set and programming, stacks subrouting, interrupt structure and I/O technique, interfacing concepts and devices, programmable, interfacing devices serial I/O: 16-bit microprocessor, architecture of 8086.