

प्रोग्रामर ग्रेड-2 के पद पर पदोन्नति द्वारा भर्ती प्रक्रिया के अन्तर्गत विभागीय परीक्षा हेतु लिखित परीक्षा का पाठ्यक्रम

क्र०सं०	विषय	निर्धारित अंक
1-प्रथम भाग	सूचना प्रौद्योगिकी	100
2-द्वितीय भाग	कम्प्यूटर प्रोग्रामिंग	100
	कुल योग	200

प्रथम-भाग- सूचना प्रौद्योगिकी (Information Technology)

Digital Logic

Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point)

Computer Organization and Architecture

Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Programming and Data Structures

Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithms

Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes P, NP, NP-hard, NP-complete.

Compiler Design

Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

Operating System

OS: Windows/ Unix Commands & Tools, Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Workplace productivity Tools :

Word Processing Tools, Electronic spreadsheets, Electronic presentation tools. Microsoft Office (Word, Excel, Power Point, Access), Open Office, Using these tools in English and official Indian languages (Windows, Unix and Unicode Fonts), Exchange of Files across these platforms.

Databases

ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Information Systems and Software Engineering

Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

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 basic concepts of public key and private key cryptography, digital signature, firewalls.

Web technologies

HTML, XML, basic concepts of client-server computing.

द्वितीय-भाग- कम्प्यूटर प्रोग्रामिंग Computer Programming

Introduction:

History of Computing, Future of Computing, Trends in Programming Language.

Programming Language:

(i) Introduction to 'C' Language, Conditional Statements and Loops, Arrays, Functions, Storage Classes, Structures and Unions, Pointers, Self Referential Structures and Linked Lists, Recursion, Parameter Passing, Scope, Binding, Abstract Data Types, Stacks, Queues, Trees, Binary Search Trees, Binary Heaps, Programming & Problem Solving Through 'C' Language.

(ii) **C++ with Object Oriented Programming:** Overview of Object Modeling, Object and Dynamic Modeling, Functional Modeling, System and Object Design, Comparison of Existing Methodology, Programming Style in object Oriented Language, Non-Object Oriented, Relational Date Base Object, Object Diagram Compiler, distributed Design System.

An overview of C, Origin of C++, Classes and Objects, arrays, Pointers and references, Functions and Operator Overloading, Inheritance, Virtual Function and Polymorphism, C++ I/O, System Basics, C++ files I/O, Array based I/O, Templates and Generic Programming, Exception Handling, Templates.

(iii) **Java-** Java Applets, Graphics, Graphical User Interfaces, Exception Handling, Threads; Java basics, Java coding conventions, Java API, Garbage collection, I/O Streams, Java database connectivity.

Parallel Computing:

MPI, OpenMP, Threads.

Java Script:

If, if.....else. switch statements, Loop statements (for/while/do----while), Objects (Date and Months), Using Buttons, Object Handling Statements (for-----in/with). JavaScript functions.

Internet and web programming:

Foundations for Internet programming-An overview of Internet Programming-TCP/IP Protocol Model, LAN Topologies, Internet working IP Address & Domain Names, Client Server Model, WWW Design Issue, Security and Encryption, Developing Internet Application, Java and Internet, Java Development Environments, Introduction to Java Programming, Visual C++, Tools for Internet and Desktop, Extending Java using Active X, CGI & Internet Application, Perl and Internet, Perl in Internet Application, Microsoft Implementation using win 32 Internet (WinLnet), Jawa script, VB Script, VB Script Language, Internet Markup Language (HTMP, SGML) Netscape Extension, Microsoft Internet only HTML, Text Shockwave and Lingo; creating an active X control to Active Web Page, Creating Netscape Navigator, Pulling Web Information, Creating a custom Integrated Application and Real Audio.