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**Arunachal Pradesh  
Public Service Commission  
Itanagar**

**NOTIFICATION**

**No. PSC-Estt/10/2019:::**

**Dated Itanagar the 24<sup>th</sup> June'2019**

In exercise of the powers conferred by the proviso to Article 318 of the Constitution, the Chairman of Arunachal Pradesh Public Service Commission hereby makes the syllabus for recruitment to the post of Computer Programmer for the Commission from the date of Notification.

**SYLLABUS FOR RECRUITMENT TO THE POST OF COMPUTER PROGRAMMER (GROUP-B)**

**1. Introduction to Computer and Programming Concept:**

Classification of Computers; Computer Organizations; Number systems; Logic gates; Boolean functions; AND, NAND, OR, NOR, XOR implementation; Binary codes; Basics of combinatorial and Sequential Circuits, Polling and Daisy chaining; Programming fundamentals; Concept of algorithm development; Techniques of problem solving; Flow Chart, Pseudo code, Features of a Programming Language: Character Set, Identifiers, Keywords, Data Types, Variables, Declarations; types of statements; flow control states; functions etc. ; Program debugging concepts; Object oriented programming: methodologies; programming in C and C++.

**2. Computer Architecture:**

Combinatorial and sequential circuit design; subsystems of a computer; Instructions and their formats; Micro instructions; Assembly programming; Data bus concept; Memory organization and hierarchy; virtual Memory, Cache memory; MIMD and SIMD computers; CISC and RISC processors; superscalar processors; array processor, pipeline processors; vector processor; Multiprocessor systems, Interconnection techniques for parallel processing, Parallel Programming concepts; parallel algorithms for multiprocessors; Data flow machines, Structure of RAM, ROM, PAL, DRAM, SCSI Hard disk.

**3. Data Structure:**

Introduction to programming methodologies and design of algorithm; Introduction to data structures, abstract data types, analysis of algorithms. Representation of Data; Control flow concept; Creation and manipulation of data structures: Static and dynamic implementation of data structures; arrays, linked lists, stacks, queues, trees, heaps, hash tables, balanced trees, tries, graphs; Searching and sorting techniques; order statistics, depth-first and breadth-first search, shortest paths and minimum spanning tree.

#### 4. Operating System:

Operating system overview and functions; Processes and Threads, Process and CPU scheduling; Detection, Avoidance and Prevention of deadlocks; Process synchronization, Mutual exclusion, Shared data, Critical sections; Tools and Constructs for Concurrency; Classical problem of synchronization; Memory management; Contiguous and non-contiguous allocation, Paging and Virtual memory concept; Page scheduling and replacement algorithms, Working set model; Segmentation; File management; security and protection mechanisms; I/O management, disk scheduling; Clocks, terminals. Case studies of design of UNIX, Linux, Windows, Android operating systems, an overview of network and distributed operating systems.

#### 5. Software Engineering & Design:

Phase of software development life cycle; Software project planning; Development process: planning; project scheduling and tracking; software development models; Cost estimation and evaluation techniques, cost estimation based on models like COCOMO and Raleigh model; System design and modelling, design approaches: top-down & bottom-up, structured, object based & object oriented design; Design specification and notations, verification, validation and performance evaluation; concept of reliability, software faults, errors, repair and availability; reliability and availability models; Software testing methods; Software quality assurance, Quality models like ISO 9000 and SEI-CMM; Real time and distributed system.

#### 6. Programming Language:

Knowledge of one or more programming languages like C, C++, Java, C#, VB; Knowledge of web designing/scripting and HTML/DHTML, ASP programming etc.; Backend software like MSSQL, Oracle etc.

#### 7. Database Management System:

Data Models: ER model, Relational model; ER diagram, UML class diagram, Data abstraction and data integration; components of DBMS; relational database design and data manipulations; Query languages: relational algebra and calculus, SQL, MySQL, MSSQL; functional dependencies, normalization techniques; Database Table, Different key concepts like primary, secondary, foreign key etc. Oracle-Data types, SQL: Function, procedure, cursor, exceptions, triggers etc.; Implementation techniques of database management systems (index structures, concurrency control, recovery and query processing); management of semi-structured and complex data; distributed and noSQL databases; MongoDB, Integrity and Security; XML and Xquery.

## 8. Computer Network Concept:

Data communication foundations; Data transmission; Analog and Digital data transmission; Time and frequency domain concepts; Data encoding and decoding concepts; Modulation techniques; Computer network concepts; OSI and TCP/IP layer models; LAN, MAN and WAN concepts LLC and MAC protocols; Data link layer; Network layer: Routing algorithms; Internetworking; IP addressing and Subnets; Transport Layer: TCP, UDP protocol and their applications, Concept of Sockets; Connection management, Quality of Service; Application layer: E-mail, Remote login, RPC, File transfer, Network file system, Network management. TCP/IP network programming using sockets.

## 9. Web/Scripting:

Introduction to World Wide Web (HTML, DHTML, HTTP, CGI); Basic interface concepts such as forms, controls, events, etc. Use of these concepts in the creation of dynamic and interactive documents for the Internet. Programming Using Java, Graphical User Interface Programming using Java; Socket programming in Java; JavaScript, Angular JS, ASP, JSP; client-side scripting in JavaScript including jQuery and JSON, server-side scripting in conjunction with AJAX; Use of database systems supporting interactive SQL. Two-tier client-server applications using JDBC or ODBC, Three-tier web applications using Java Servlets/JDBC or equivalent. Design of applications and user interfaces using these systems.

Secretary  
Arunachal Pradesh  
Public Service Commission  
Itanagar