

## **Plan of Written Examination**

All the aspirants are informed as under with respect to the written test to be conducted for the recruitment for the post of **Senior Assistant (IT) (Adv. No. 05 of 2023)** :-

1. The Exam will be conducted in MCQ (Multiple Choice Questions) format. OMR sheet will be used for answering the questions.
2. The Exam would be of 2 hours duration.
3. The Exam will consist of two parts (Part A and Part B) as follows:-

<b>Part</b>	<b>Topic</b>	<b>No. of Questions</b>	<b>Marks (Each Question carries 1 mark)</b>	<b>Type of Questions</b>
A	Questions from General Knowledge and Current Affairs, Punjab History and Culture, Logical Reasoning and Mental ability, Punjabi, English, ICT, (Annexure-1)	40	40	MCQs (Multiple Choice Questions)
B	Questions from the Subject (Annexure-2)	80	80	MCQs (Multiple Choice Questions)
<b>Total</b>		<b>120</b>	<b>120</b>	

4. ***There will be negative marking. Each question carries 1 mark. For every wrong answer, 1/4<sup>th</sup> mark i.e. 0.25 mark would be deducted. The question(s) not attempted will receive no credit or discredit.***
5. ***Tentative syllabus for the written examination for the recruitment of Senior Assistant (IT) is annexed at Annexure-1 and Annexure-2.***

## Annexure - 1

### **Part A - General Knowledge, Punjab History and Culture, Logical Reasoning Mental Ability, Punjabi, English and ICT.**

Sr. No.	<i>Indicative Contents of Syllabus</i>	<i>Weightage (Approx.)</i>
1.	<p><b>General Knowledge and Current affairs of National and International importance including:</b></p> <ul style="list-style-type: none"> <li>(i) Polity issues,</li> <li>(ii) Environment issues,</li> <li>(iii) Current Affairs,</li> <li>(iv) Science and Technology,</li> <li>(v) Economic issues,</li> <li>(vi) History of India with special reference to Indian freedom struggle movement.</li> <li>(vii) Sports,</li> <li>(viii) Cinema and Literature.</li> <li>(ix) Geography</li> </ul>	10
2.	<p><b>Punjab History and Culture:-</b> Physical features of Punjab and its ancient history. Social, religious and economic life in Punjab. Development of Language &amp; literature and Arts in Punjab, Social and culture of Punjab during Afgan/Mughal Rule, Bhakti Movement, Sufism, Teachings/History of Sikh Gurus and Saints in Punjab. Adi Granth, Sikh Rulers, Freedom movements of Punjab.</p>	5
3.	<p><b>Logical Reasoning &amp; Mental Ability:</b></p> <ul style="list-style-type: none"> <li>(i) Logical reasoning, analytical and mental ability. (05 Marks)</li> <li>(ii) Basic numerical skills, numbers, magnitudes, percentage, numerical relation appreciation. (03 Marks)</li> <li>(iii) Data analysis, Graphic presentation charts, tables, spreadsheets. (02 Marks)</li> </ul>	10
4.	<p><b>ਪੰਜਾਬੀ:-</b> ਸ਼ੁੱਧ-ਅਸ਼ੁੱਧ, ਸ਼ਬਦਜੋੜ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ, ਸਮਾਨਾਰਥਕ/ਵਿਰੋਧੀਸ਼ਬਦ, ਨਾਂਵ, ਪੜਨਾਂਵ ਅਤੇ ਕਿਰਿਆ ਦੀਆਂ ਕਿਸਮਾਂ ਤੇ ਸਹੀ ਵਰਤੋਂ, ਲਿੰਗ ਅਤੇ ਵਚਨ, ਪੰਜਾਬੀ ਅਖਾਣ ਤੇ ਮੁਹਾਵਰੇ, ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਅਤੇ ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਦੀ ਥਾਂ ਇੱਕ ਸ਼ਬਦ ਆਦਿ।</p>	5
5.	<p><b>English:-</b> Basic Grammar, Subject and Verb, Adjectives and Adverbs, Synonyms, Antonyms, One Word Substitution, Fill in the Blanks, Correction in Sentences, Idioms and their meanings, Spell Checks, Adjectives, Articles, Prepositions, Direct and Indirect Speech, Active and Passive Voice, Correction in Sentences, etc.</p>	5
6.	<p><b>ICT:-</b> Basics of computers, Network &amp; Internet, Use of office productivity tools Word, Excel, Spreadsheet &amp; PowerPoint.</p>	5
	<b>Maximum Marks</b>	<b>40</b>

## Annexure – 2

### Part B - Subject Syllabus for the post of Senior Assistant (IT)

Number of Questions 80

Maximum Marks- 80

#### 1. Computer System Architecture

- **Digital Logic Circuits and Components:** Digital Computers, Logic Gates, Boolean Algebra, Map Simplifications, Combinational Circuits, Flip-Flops, Sequential Circuits, Integrated Circuits, Decoders, Multiplexers, Registers and Counters, Memory Unit.
- **Data Representation:** Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms.
- **Register Transfer and Microoperations:** Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Micro operations.
- **Basic Computer Organization and Design:** Stored Program Organization and Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt.
- **Programming the Basic Computer:** Machine Language, Assembly Language, Assembler, Program Loops, Subroutines, Input-Output Programming.
- **Microprogrammed Control:** Control Memory, Address Sequencing, Design of Control Unit.
- **Central Processing Unit:** General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC Computer, CISC Computer.
- **Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Serial Communication.
- **Memory Hierarchy:** Main Memory, Auxillary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

#### 2. Programming Languages

- **Programming in C:** Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Arguments, Preprocessors.
- **Object Oriented Programming:** Class, Object, Instantiation, Inheritance, Encapsulation, Abstract Class, Polymorphism.
- **Programming in C++:** Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.

### 3. Database Management Systems

- **Database System Concepts and Architecture:** Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; Centralized and Client/Server Architectures for DBMS.
- **Data Modeling:** Entity-Relationship Diagram, Relational Model - Constraints, Languages, Design, and Programming, Relational Database Schemas, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.
- **Normalization for Relational Databases:** Functional Dependencies and Normalization; Algorithms for Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques, Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.

### 4. Operating System

- **Basics of Operating Systems:** Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot.
- **Process Management:** Process Scheduling and Operations; Interprocess Communication, Communication in Client-Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization.
- **CPU Scheduling:** Scheduling Criteria and Algorithms; Thread Scheduling, MultipleProcessor Scheduling, Real-Time CPU Scheduling.
- **Deadlocks:** Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock.
- **Memory Management:** Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.
- **Storage Management:** Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.

### 5. Data Structures and Algorithms

- **Data Structures:** Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B\* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing.
- **Performance Analysis of Algorithms and Recurrences:** Time and Space Complexities; Asymptotic Notation, Recurrence Relations.
- **Design Techniques:** Divide and Conquer; Dynamic Programming, Greedy Algorithms, Backtracking, Branch and Bound.

### 6. Data Communication and Computer Networks

- **Data Communication:** Components of a Data Communication System, Simplex, Half Duplex and Duplex Modes of Communication; Analog and Digital Signals;

Noiseless and Noisy Channels; Bandwidth, Throughput and Latency; Digital and Analog Transmission; Data Encoding and Modulation Techniques; Broadband and Baseband Transmission; Multiplexing, Transmission Media, Transmission Errors, Error Handling Mechanisms.

- **Computer Networks:** Network Topologies, Local Area Networks, Metropolitan Area Networks, Wide Area Network, Wireless Networks, Internet.
- **Network Models:** Layered Architecture, OSI Reference Model and its Protocols; TCP/IP Protocol Suite, Physical, Logical, Port and Specific Addresses; Switching Techniques.
- **Functions of OSI and TCP/IP Layers:** Framing, Error Detection and Correction; Flow and Error Control; Sliding Window Protocol, HDLC, Multiple Access – CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, CDMA, TDMA, Network Devices, Backbone Networks, Virtual LANs.
- IPv4 Structure and Address Space; Classful and Classless Addressing; Datagram, Fragmentation and Checksum; IPv6 Packet Format, Mapping Logical to Physical Address (ARP), Direct and Indirect Network Layer Delivery; Routing Algorithms, TCP, UDP and SCTP Protocols; Flow Control, Error Control and Congestion Control in TCP and SCTP.
- **World Wide Web (WWW):** Uniform Resource Locator (URL), Domain Name Service (DNS), Resolution - Mapping Names to Addresses and Addresses to Names; Electronic Mail Architecture, SMTP, POP and IMAP; TELNET and FTP.
- **Network Security:** Malwares, Cryptography and Steganography; Secret-Key Algorithms, Public-Key Algorithms, Digital Signature, Virtual Private Networks, Firewalls.
- **Mobile Technology:** GSM and CDMA; Services and Architecture of GSM and Mobile Computing; Middleware and Gateway for Mobile Computing; Mobile IP and Mobile Communication Protocol; Communication Satellites, Wireless Networks and Topologies; Cellular Topology, Mobile Adhoc Networks, Wireless Transmission and Wireless LANs; Wireless Geolocation Systems, GPRS and SMS.
- **Cloud Computing and IoT:** SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement, Basics of IoT.