INFORMATION TECHNOLOGY SPECILISATION SCHOOL, INS VALSURA
SYLLABUS FOR ENTRANCE EXAM (SAILORS)

This document pertains to the syllabus to be covered by candidates appearing for the entrance exam for Sailors' Course of ITSS. The listed topics need to be covered **broadly** in an analytical manner with focus on the **'whys'** behind the facts. The suggested Books of Reference are mostly exhaustive resources and selective reading of the listed topics is considered sufficient. Candidates may not restrict to the suggested Books of Reference till the time the listed topics are well understood from the resource of their choice.

Entrance exam will comprise of a screening test (containing objective type questions) followed by an interview for candidates who attain acceptable grades in the screening test.

Any queries/suggestions are welcome at ***pdinsvalsura@nic.in***.

1. Computer Architecture

Books/Sites of Reference:-

1.A Structured Computer Organisation by Andrew S Tanenbaum
1.B http://www.anandtech.com
1.C http://www.tomshardware.com

Topics to be Covered:-

1.1 History of Computing
- 1.1.1 Generation of Computers
- 1.1.2 Moore's Law
- 1.1.3 History of x86 Architecture and Desktop PCs

1.2 Processors
- 1.2.1 Internals of CPU
  CU, ALU
- 1.2.2 Registers
  Accumulator, PC, SP etc.
- 1.2.3 Code Execution
  Fetch, Decode, Data Input and Execute
- 1.2.4 Parallelism
  Processor and Instruction Level
- 1.2.5 RISC and CISC

1.3 Memory Hierarchy and Organisation
- 1.3.1 Addressing
- 1.3.2 Caching

1.4 Primary Memory
- 1.4.1 Volatile
  SRAM, DRAM
- 1.4.2 Non-volatile
  ROM, PROM, EPROM, EEPROM, Flash

1.5 Secondary Memory
- 1.5.1 Magnetic Storage
- 1.5.2 Optical Storage
- 1.5.3 Magnetic Tape
- 1.5.4 Hard Disk
- 1.5.5 CD/DVD-ROM
- 1.5.6 Storage Interfaces
  IDE, SCSI, SATA, SAS
- 1.5.7 RAID Technologies
- 1.5.8 Solid State Disks

1.6 IO Technologies
- 1.6.1 Buses
  PCI, PCI-Express
- 1.6.2 Ports
  Parallel, Serial, USB, Fire wire
- 1.6.3 Display Interfaces
  RGB, DVI

1.7 Modern Computer Architecture
- 1.7.1 Intel Core 2 Architecture
  MCH, ICH, FSB
- 1.7.2 AMD Athlon 64 Architecture
  Hyper Transport
- 1.7.3 Intel Nehalem Architecture
  Quick Path Interconnect

1.8 General Knowledge on Latest PC/Server Hardware
- 1.8.1 Differences between Server and Desktop Hardware

2. Operating Systems

Books of Reference:-

2.A Modern Operating Systems by Andrew S Tanenbaum

2.B Operating System Concepts by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne

Topics to be Covered:-

2.1 Operating System Structures
2.2 Processes
- 2.2.1 Process Creation
- 2.2.2 Process Termination
- 2.2.3 Process States

2.3 Threads
- 2.3.1 Thread Model
- 2.3.2 Thread Usage

2.4 Inter-process Communication
2.4 CPU Scheduling
2.5 Process Synchronisation
2.6 Deadlocks (Basics)
2.7 Memory Management
- 2.7.1 Paging
- 2.7.2 Virtual Memory
- 2.7.3 Swapping

2.8 Input/Output Management
- 2.8.1 Programmed Input/Output
- 2.8.2 Direct Memory Access
- 2.8.3 Interrupt Driven Input/Output
  Interrupt Handlers
- 2.8.4 Device Drivers

2.9 File System
- 2.9.1 File Naming, Structure, Types, Access and Attributes
- 2.9.2 File Operations
- 2.9.3 Directories
- 2.9.4 File System Layout
- 2.9.5 Disk Space Management

3. <u>Computer Networking</u>

Books of Reference:-

3.A Computer Networks by Larry L Peterson and Bruce S Davie
3.B Computer Networks by Andrew S Tanenbaum

Topics to be Covered:-

3.1 Definition of Computer Networking
- 3.1.1 Bandwidth and Latency

3.2 Classification of Computer Network
- 3.4.1 Topology
  Star, Mesh, Tree, Bus, Ring etc.
- 3.4.2 Type/Size
  PAN, LAN, CAN, MAN, WAN etc.

3.3 Layering in Networks
- 3.2.1 Need
- 3.2.2 Concept
- 3.2.3 Advantages

3.4 Seven Layer OSI Model of Networking
- 3.4.1 Functionality of each layer

3.6 The Internet
- 3.6.1 IETF and RFCs
- 3.6.2 TCP/IP Model of Networking

3.7 Physical Layer
- 3.7.1 Physical Medium
  Co-axial, Twisted Pair, Fibre, Wireless
- 3.7.2 Modulation and Encoding
- 3.7.3 Physical Layer of Ethernet
  Co-axial, Twisted Pair

3.8 Data Link Layer
- 3.8.1 Framing
  Bit-level, Byte-level
  Bit-stuffing, Byte-stuffing
- 3.8.2 Error Detection/Correction
- 3.8.3 Framing in Ethernet

3.9 MAC Sub-layer
- 3.9.1 Multiple Access Techniques
  CSMA-CD, CSMA-CA
  Token Ring
- 3.9.3 ALOHA
- 3.9.4 MAC in Ethernet

3.10 Network Layer
- 3.10.1 Hierarchical Addressing
- 3.10.2 Circuit Switching and Packet Transfer
- 3.10.3 Types of Routing
  Fixed, Source, Dynamic
- 3.10.4 Basics of Routing Protocols
  Distance Vector, Link State
- 3.10.5 Internet Protocol v4
- 3.10.6 Subnet and Gateway
- 3.10.7 Classless Inter-domain Routing
- 3.10.8 DHCP, ARP and RARP

3.11 Transport Layer
- 3.11.1 Multiplexing
- 3.11.2 Reliability using Acknowledgements
- 3.11.3 Sliding Window Protocol
- 3.11.4 TCP and UDP
  Concept of Ports

3.11.5 Connections in TCP
3.12 Application Layer
3.12.1 DNS
3.12.2 Electronic Mail
3.12.3 World Wide Web
3.12.4 FTP

4. Database Concepts

Books of Reference:-

4A. Database System Concepts by Abraham Silberschatz, Henry F Korth and S Sudarshan

Topics to be Covered:-

4.1 Database Systems
4.1.1 Purpose
4.1.2 Data Abstraction
4.2 Relational Databases
4.2.1 Structure
4.2.2 Relational Algebra

5. Digital Logic

Books of Reference:-

5A. Digital Logic and Computer Design by M Morris Mano

Topics to be Covered:-

5.1 Binary Systems
5.1.1 Digital Computers and Systems
5.1.2 Binary Numbers
5.1.3 Number Base Conversion
Binary, Octal, Decimal, Hexadecimal
5.1.4 Complements
5.1.5 Binary Codes
Binary Coded Decimal
5.1.6 Binary Storage
5.1.7 Binary Logic
5.2 Boolean Algebra
5.2.1 Basic Theorems and Properties
5.2.2 Boolean Functions
5.2.3 Logical Operations
5.3 Digital Logical Gates
5.4 Basics of Probability and Statistics

6. Linux and Windows

General References

Topics to be Covered:-

6.1 Linux Operating System
6.1.1 Installation (of any latest flavour)
6.1.2 Installation of Applications
6.1.3 Exploitation of Command Line Interface
6.2 Windows Operating System
9.2.1 Installation (of any version)
9.2.2 Installation of Applications