# ALLAHABAD STATE UNIVERSITY, ALLAHABAD

## Syllabus

## Computer Science

## B. Sc. Part-1

There shall be three papers and a practical as follows :

| | | Max. Marks |
|---|---|---|
| 1. | Digital Electronics | ..... |
| 2. | Fundamentals of Computer Systems | ..... |
| 3. | Fundamentals of Programming & C Language | ..... |
| | Practical | |

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Total Marks .....

## B. Sc. Part-2

## Computer Science

There shall be three papers and a practical as follows :

| | | Max. Marks |
|---|---|---|
| 1. | Computer Architecture | ..... |
| 2. | Database Management System | ..... |
| 3. | Data Structures | ..... |
| | Practical | |

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Total Marks .....

## B. Sc. Part 3

## Computer Science

There shall be four papers and a practical as follows:

| | | Max. Marks |
|---|---|---|
| 1. | Java Programming | |
| 2. | Computer Networks | |
| 3. | Operating Systems | |
| | Practical + Project | |

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Total Marks .....

TOTAL .....

## B.Sc. Part-1

## Computer Science

## Paper-2: Fundamentals of Computer Systems

History of Computation, Generation of Computers; Functional Block Diagram of a Computer, ALU , central processing unit, memory; Types of Computer; Application of Computers in modern society.

Elements of Computer : Hardware and Software; Components of a system: memory, CPU, I/O; Basic I/O methods; Types of Memory; Memory organization and interleaving; Extended and expanded memory; Memory map of a system; Single user, multi-user, time-shred and distributed system.

Design of Keypad, Various types of displays – interlaced & non-interlaced; Display adapters, Display Techniques; Types of buses – ISA, EISA, VESA, PCI, SCSI; Interfacing Serial & Parallel devices; Need of quantization techniques.

Interfacing devices to a computer; Serial and parallel interface; USB Ports; Types of Display: CRT LCD; Synchronous and asynchronous communication; Interfacing ADC and DAC; Interfacing a modem; Mouse & Trackball; Secondary storage devices; Floppy Disk, Hard Disk, Compact Disk, DVD; Elementary idea of working of Dot Matrix Printers, Inkjet Printers and Laser Printers; Programmable interrupt controller; DMA controller

**References :**


1. Introduction to Digital Computer Design : Mano, Morris M.
2. Inside IBM PC : Peter Norton

## B.Sc. Part-1

## Computer Science

## Paper-3: Fundamentals of Programming & C Language

Algorithms; Flowchart representation and pseudo-code development; Stages in Program development; Low, middle and high level languages; Languages translators; Syntax and logical errors.

Algorithm development : Prime number generation, random number generation; Euclid algorithm for gcd finding; Searching-Linear and binary search algorithms; Sorting techniques: Insertion soft; Selection sort; Bubble Sort; Shell sort; Heap Sort and Quick sort; String comparison; String concatenation and sub-string searching; Horner's method for evaluating polynomials; Monte-carlo integration

Features of C Language Variables, Data type Operators; expression; control flows; arrays; structures; I/O operations; functions; storage classes, files and pointers.

**References:**


1. How to solve it by Computers : Droomey
2. Computer Algorithms : Horowitz & Sahni
3. Programming with C : Gottfired B
5. The C Programming Language : Kernigham & Ritchie

## B.Sc. Part-2

## Computer Science

## Paper-I: Computer Architecture

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt.

Central Processing Unit: Register organization, arithmetic and logical operations, stack organization, micro programmed control.

Programming the Basic Computer: Instruction formats, addressing modes , instruction codes, machine language, assembly language, input output programming.

Input-output Organization: Peripheral devices, I/O interface, Modes of data transfer, direct memory access.

Case study: 8085 & 8086

**References :**


1. Computer System Architecture: M. Mano, Pearson Education
2. Leventhal, L. A. (1987), 8080A-8085 Assembly Language Programming, Osborne/McGraw Hill.
3. Mathur, A. P. (1995), Introduction to Microprocessors, 3rd Ed., Tata McGraw Hill.

## B.Sc. Part-2

## Computer Science

## Paper-3: Data Structures

**Introduction :**

Data structures, Representation and Implementation, Complexity calculation of algorithms, Linearity and Non-linearity of data structures.

**Linear Data Structures :**

Arrays, Ordered lists and their representations, List operations-Insertion, Deletion, Traversal; Stacks, Queues, Priority Queues, Singly and Doubly linked lists, Multilinked list and their variations, Algorithms for Polynomial additions, Sparse matrix, representation, Infix and Postfix expressions, Garbage collection.

**Non-Linear Data Structure :**

Binary Trees and their representation, Binary Tree traversals, Threaded Binary tress, Height balancing and AVL tree, union and find algorithms, Decision tree, Graphs and their representations, Graph traversal, Connected Components and spanning trees, Shortest path algorithm.

**Searching and Sorting :**

Sequential search Binary search, Hashing, Chaining and symbol tables, Collision processing, Indexed search techniques, Internal and External sorting.

**Books Recommended :**


1. Fundamentals of Data Structures : Horowitz and Sahni
2. Computer Algorithms: Horowitz and Sahni
3. An Introduction to Data Structures with Application: Tremblay and Sorenson

## B.Sc. Part-3

## Computer Science

## Paper-2: Computer Networks

**Basic concepts** : Components of data communication, standards and organizations,, Channel capacity, Baud & bit rate; Maximum data rate of a channel; MUX:TDM, FDM; Synchronous & asynchronous transmission; Network Classification, Network Topologies -Linear, Circular, Star, Tree & Graph, Ethernet, Token ring, Token bus & FDDI, ATM,; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

**Physical Layer** : Cabling, Network Interface Card, Transmission Media Devices-Repeater, Bridge, Hub, Switch, Router and Gateway.

**Data Link Layer** : Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA.

**Network Layer** : Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive)

**Transport Layer:** Transport services, Transport Layer protocol of TCP and UDP (6L)

**Application Layer** : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP

**Network Security** : Common Terms, Firewalls, Virtual Private Networks (6L)

**References:**


1. Computer Networks: Andrew S. Tanenbaum
2. D.E. Comer, Internetworking with TCP/IP, Vol. I, Prentice Hall of India, 1998.
3. W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of Indi