

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 | |

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 | |

Total Marks

B. Sc. Part 3

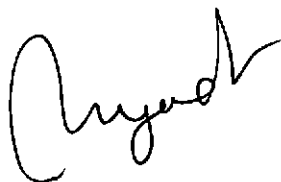
Computer Science


There shall be four papers and a practical as follows:

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

Total Marks

TOTAL









B.Sc. Part-I
Computer Science
Paper-I: Digital Electronics

Boolean Algebra: Decimal, Binary, Octal and Hexadecimal number systems and their inter-conversion; BCD, ASCII, Boolean algebra, De-Morgan's law SOP and POS representation of Boolean expressions; Simplification of Boolean Expressions using theorems of Boolean algebra; Karnaugh map method and its use in simplification of logic expressions.

Digital Electronic circuit: standard TTL and CMOS logic gates; Elementary idea of commonly used logic families and their relative merits and Demerits, Use of logic gates to make various switching logic circuits- Adder, Subtractor, Encoders, Decoders, Multiplexers and De-multiplexers, Priority generator, Comparator, Truth Table representation; Sequential logic circuits and their implementation; Flip flops- R-s, JK, D and T flip flop, Clocked and Edge triggered Flip flops; Counters, Shift registers; Binary, BCD and modulo counters.

Elementary idea of basic memory element and tri-state logic; bus organization; Various types of semiconductor memories like RAM, EPROM; SRAM and DRAM

References :

1. Digital Electronics Book by Morris Mano
2. Digital Electronics by Malvino

Jan

R. K. Rana
Rajeev Singh

Anjali

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.

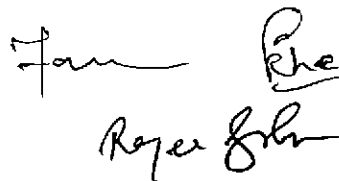
Elements of Computer : Hardware and Software; Components of a system: memory, CPU, I/O; Basic I/O methods; Types of Memory; Memory organization and interleaving; Extended and expanded memory; Memory map of a system; Single user, multi-user, time-shred and distributed system.

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

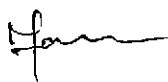
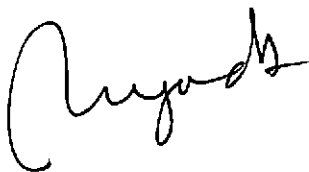
Algorithms; Flowchart representation and pseudo-code development; Stages in Program development; Low, middle and high level languages; Languages translators; Syntax and logical errors.

Algorithm development : Prime number generation, random number generation; Euclid algorithm for gcd finding; Searching-Linear and binary search algorithms; Sorting techniques: Insertion sort; 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 : Drommey
2. Computer Algorithms : Horowitz & Sahni
3. Programming with C : Gottfried 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.



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B.Sc. Part-2
Computer Science
Paper-2: Database Management System

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99: Schema Definition , constraints

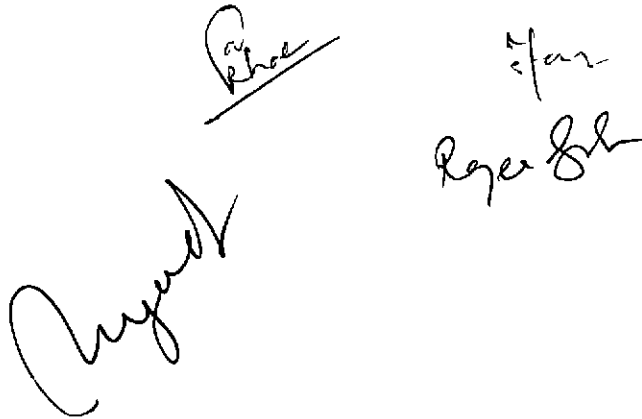
Relational Data Model : Basic concepts, relational constraints, relational algebra, SQL queries.

Database design: ER to relational mapping, functional dependencies, normal forms upto third normal form.

SQL basics, Data manipulation commands, Data definition commands, Data Control Language Commands

References:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.



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 :

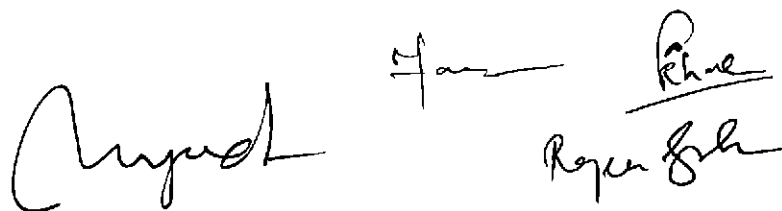
Binary Trees and their representation, Binary Tree traversals, Threaded Binary trees, Height balancing and AVL tree, union and find algorithms, Decision tree, Graphs and their representations, Graph traversal, Connected Components and spanning trees, Shortest path algorithm.

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-1: JAVA Programming

Introduction to Java: Features of Java, JDK Environment

Object Oriented Programming Concept, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA

Java Programming Fundamental: Structure of java program, Data types, Type Casting, Variables, Operators, Keywords, Naming Convention, Control statements,

Classes and Objects: Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance and Polymorphism, Method Overloading, Method Overriding

Arrays and Strings: Arrays, Creating an array, Types of Arrays, String class Methods, String Buffer methods.

Abstract Class, Interface and Packages: Modifiers and Access Control, Abstract classes and methods, Interfaces, Packages Concept, Creating user-defined packages

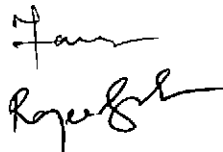
Exception Handling: Exception types, Using try catch and multiple catch, Nested try, throw, throws and finally, Creating User defined Exceptions.

File Handling: Byte Stream, Character Stream, File IO Basics, File Operations, Creating file, Reading file, Writing File

Applet Programming: Introduction to Applet, Applet Life cycle, Creating Applet, Applet tag

Books Recommended:

1. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
2. . E Balagurusamy , Programming with JAVA, TMH, 2007



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)

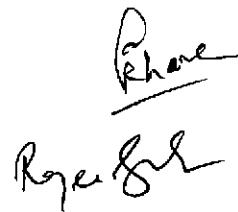
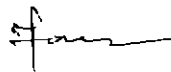

Transport Layer: Transport services, Transport Layer protocol of TCP and UDP (6L)

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



B. Sc. Part-3
Computer Science
Paper-3: Operating System

Overview:

Definition of operating system (OS), History of OS, Simple Batch Systems, Multi-programmed Batched Systems, Time-Sharing Systems, Personal Computer system, Distributed Systems and Real-Time Systems, Operating System, Operating System Services, System Calls, System Programs.

Process Management:

Process Concept, Process control Block, process Scheduling, CPU scheduling-Basic Concepts and methods, Scheduling Criteria, Round Robin Scheduling, Real Time Scheduling, Definition Deadlock, Deadlock Characterizations, method for Handling Deadlocks, Deadlock prevention, Avoidance, Detection, recovery from Deadlock.

Memory Management:

Basic Concepts , Logical and Physical Address Space, Swapping, Contiguous Allocation, Non-contiguous allocation - Paging, Segmentation, Virtual Memory- Demand Paging, Paging Replacement, Thrashing and Demand Segmentation.

File System:

File Concept, Access Methods, Directory Structure, Protection, File System Structure. Allocation methods, Disk Management, Disk scheduling.

References:

1. Operating system principles by A. Silberschatz, Peter Baer Galvin, Greg Gagne
2. Operating Systems: Internals and Design Principles by William Stallings

