Syllabus of B.Sc. (Computer Science)

B.Sc. I Year   effective from 2004-2005

Theory:

I Paper	:	Introduction to Computer & Programming
II Paper	:	Fundamental of Digital Electronics and Computer Organization
III Paper	:	Operating System Concepts Practical: Practical will be based on C programming, digital Electronics & O.S. commands

B.Sc. II Year effective from 2005-2006

Theory:

I Paper	:	Introduction to Data Structure & Algorithm
II Paper	:	Discrete Mathematics
III Paper	:	Numerical and Statistical Analysis Practical: Practical will be based on Data Structure, Algorithms, and Numerical

B.Sc. III Year effective from 2006-2007

Theory:

I Paper	:	Computer Architecture & Microprocessors
II Paper	:	Introduction to Database Management System
III Paper	:	Object Oriented System
IV Paper	:	Data Communication & Computers Networks
Practical	:	Practical will be based on DBMS Programming, OOP (using C++)

DETAILED SYLLABUS OF B.Sc. I YEAR

I Paper: (Introduction to Computer & Programming)

Introduction:

Overview of Digital Computer, Major Components of digital computer, Hardware, Software, Software & Firmware, Computer Application in various fields of science and managements;

Data Representation:

Decimal and binary number system, Decimal-binary conversion, Octal number system, Hexadecimal, BCD number, Binary arithmetic, Alphanumeric representation, Complements, r and (r-1)'s complements, Fixed point and floating point representation;

Introduction to Programming:

Concept of algorithm, flowchart, data flow diagram, editing tools (turbo C editor);

Programming in 'C':

An overview of C, Structure of C program, Storage class specifier & data types, variable declaration, operators & expressions;

Control Statements:

True & false in C, C statements, Conditional statements, if, switch, for, while, do-while, break, exit (), continue & go to;

Basic I/O:

Formatted & unformatted I/O, Concept of sub programming & functions, examples of different types of functions, Parameter passing technique, Recursion;

Arrays:

One dimensional, two dimensional & Multi dimensional arrays;

Pointers:

Concept of pointers, pointer operators, pointer expressions, pointer and array, Strings and string library functions;

Structure & Unions:

Overview of structure & unions, Structure and function, array of structure, structure pointer, Nested structure;

File Management:

Defining and opening a file, closing a file, input/output operations.

II Paper: (Fundamental of Digital Electronics and Computer Organization)

Digital Circuits:

Logic gates, Boolean algebra, Karnaugh Maps;

Combinational Circuits:

Half adder, Full adder, Flip-flops� RS flip-flop, D- flip-flop, JK, T-flip flop, Edge-triggered flip flop, Encoders, Decoders, multiplexers, Registers� shift register, buffer register counters;

Basic Computer Organization:

Instruction code, direct & indirect addresses, Timing and control signals, Instruction cycle, memory reference Instruction, I/O Instructions;

Computer Arithmetic:

Addition and subtraction with signed magnitude data, multiplication algorithms & Booth algorithm, hardware algorithm;

Memory:

Memory hierarchy, memory write ability and storage performance, memory units, memory types- ROM, masked programmed ROM, OTP ROM, EPROM, EEPROM, flash memory, Introduction to read-write memory � RAM, SRAM, DRAM, PSRAM, MVRAM. Cache memory, Cache mapping technique, virtual memory concept, EDO RAM, Synchronous and enhanced synchronous DRAM, Rambus DRAM (RDRAM). Transistor as a switch, Switching time, Logic circuit, active and passive logic circuits, diode logic, register logic, register transistor logic (RTL), Register capacitor transistor logic (RCTL), Integrated injection logic (I2 L), transistor- transistor logic (TTL), Emitter coupled logic (LCTL) CML and CMOS logic interfacing TTL, and CMOS logic, their characteristics and uses;

Multi vibrators:

Astable, monostable, bistable, Schmidt;

A/D Converters:

Time window and slope converters, Tracking A/D and successive approximation converters, Digital to analog converters, LED and LCD display, seven segment display.

III Paper: Operating System Concepts

Operating System Overview:

Computer system structure, operating system structure, OS functions, facilities;

Memory Management:

Single contiguous allocation, Partioned allocation, Relocatable partioned allocation, paging, segmentation, demand paged allocation;

Processor Management:

State models, Job schedulers, Process scheduling, Job and process synchronization, Race condition, deadlocks, Deadlock detection, recovery & prevention. Device Management: Different techniques, Input-output devices, storage devices, Information Management: Files systems, Features of file system, General model of file, Logical & physical file system;

Case study of DOS and windows O.S. (Introductory Concepts).

]

DETAILED SYLLABUS OF B.Sc. II YEAR

Paper I: (Introduction to Data Structure & Algorithm)

Introduction Data Structure:

Concept of Data Types- Primitive data type, Abstract data type, Polymorphic data type. Description of various data structure, Algorithms, Performance analysis & Measurement. Defining problems, Designing program, Coding, Testing, Debugging, Documentation of Program, Concept of recursion, examples of some recursive functions.

Arrays:

Definition, One dimensional, multi dimensional arrays, representations in memory;

Stacks & Queues:

Concept of stack and queue, Implementation of stack and queues in memory using array & Pointer Application of stack and queues. Evaluation of expansion (Postfix, Infix, Prefix), Circular queues - Priority queues;

Linked List:

Introduction of Linked list, Representation of Linear linked List, Operation of Linear linked list.

Trees:

Introduction and basic terminologies, Binary tree, Binary search tree, Representation of Binary search tree using array & linked list. Searching & Sorting Technique and their analysis of algorithm.

Searching:

Linear search, Binary search

Sorting:

Bubble sort, Quick sort, Insertion sort, Merge sort.

II Paper: (Discrete Mathematics)

Fundamentals:

Sets, Subsets, Operation on Set, Finite & Infinite Sets, Relations & Properties of Relations, Equivalence Relations Boolean Algebra Poset.

Lattices:

Lattice as Poset, Properties of Lattice, Sublattice, distributed & Complemented Lattice;

Boolean algebra:

Boolean Lattice & Boolean Algebra, Uniqueness of Finite Boolean Algebra Boolean function & expression, Use of K-maps. Graph Terminology & Application of graphs, Finite & Infinite Graphs, Homomorphism, Subgroups, Walks Paths & Circuits, Connected graph, Eulaline & Euler graphs, Operations on graphs, Hamiltonian Path and Circuits;

Trees:

Properties of Tree, Distance & Center in Tree, Rooted and Binary Trees, Spanning Trees, Matching, Matrix Representation, Graph, Coloring, Chromatic Partitions and Coverings, Directed Graph;

Mathematical Logic:

Statements & Notations, Tautologies, Disjunctives & Conjunctives Normal forms, Equivalence of Statements.

III Paper: (Numerical and Statistical Analysis)

Approximations & Errors:

Significant figures, Accuracy & precision, Different types of errors, Error propagation, Total Numerical error with control;

Roots of equations:

Graphical Method, Bisection methods, False Partition method, Newton Raphson method, Secant method, Convergence;

System of Linear Algebraic equation:

Matrix notation, Representation of simultaneous linear algebraic equation in matrix form, Determinants, Crammers Rule, Gauss-Jaurdan and LU decomposition methods, Pivoting and scaling, Interactive Gauss-Seidel method , Introduction and Curve fitting, Lagrangian polynomials, Newton's methods, Forward Difference methods, Numerical differentiation by polynomial fitting;

Numerical Integration:

The rectangle rule, Trapezoidal rule, Simpron 1/3 and 3/8 rule;

Statistical Analysis:

Measure of Central Tendency, Preparing frequency distribution table, Mean, Arithmetic mean, Harmonic mean and Measure of Dispersion, Skewness & Kurtosis, Ranges, Mean deviation Standard deviation, Coefficient of Variation, Moments Skew ness, Kurtisis, Correlation;

Linear regression:

Polynomial regression, multiple linear regression.

DETAILED SYLLABUS OF B.Sc. III YEAR

I Paper: Computer Architecture & Microprocessors

Principles of Computer Design, basic components of digital computer system, overview of construction and operation of arithmetic logic unit (ALU);

Register transfer and micro operators:

Register transfer language, bus and memory transfers, arithmetic micro operators, logic micro operators, Shift micro operators, Bus structure, multiple bus hierarchies, elements of bus design, PCI bus structure;

Memory:

Linear selected memory organization and coders. Dimension of memory access, connecting memory chips to a computer bus, Magnetic disk memories, Floppy disk, Magnetic tape, Cassettes and cartridges;

Input-Output Devices:

Fundamental of keyboards, printers, CRT and LCD displays devices and terminals;

Central Processing Unit (CPU):

General register and organization, Memory stack, One address and two address instructions, data transfer, arithmetic logic and shift instructions, software and hardware interrupt (Only brief introduction), arithmetic and instruction pipe lines;

Control Unit:

Construction of instruction word, instruction cycle and execution cycle organization of control registers, Sequence of operation of control registers, controlling arithmetic operators, BRANCH, SKIP or JUMP instructions, SHIFT instructions, Register language, Microprogramming.

II Paper: Introduction to Database Management System

Concept of Database and its evaluation, Data abstraction and data integration, the three level architecture of a DBMS, Components of a DBMS, data models and their implementations: Relational, Network, Hierarchical. Relational data manipulation: Relational algebra, relational calculus, SQL;

Relational Database Design:

Functional dependencies, 1st to 3rd Normal form, BCNF, FoxPro�
Introduction to FoxPro, database construction, searching, sorting, indexing, updation, Reports, Screen designing, Programming concepts, Managing numbers & data.

III Paper: Object Oriented System

1. **Introduction to Object Oriented Concept:** Overview of object oriented system, Abstract data Types, Inheritance, Polymorphism, Object Identity, Object Modeling Concepts, Object Oriented Design, Object Oriented Programming Languages, Object Oriented Database.

2. **C++ Programming Language:** Overview of C++, Programming Paradigm, Support For Data Abstraction, Support for Object Oriented Programming, Declaration and Constants, Expression and Statement, Function and Files: Linkages, How to Make a Library, Functions.

3. **Classes and Objects:** Definition of Class, Class Declaration, Class Function Definition, Member Function definition inside and outside the class declaration, Scope resolution operator(: :), Private and Public member function, Nesting member function, Creating Objects, Accessing Class data members, Accessing member functions, Arrays of Objects, Objects as function arguments.

4. **Operator Overloading:** Operator Function, User Defined Type Conversion, Litreral, large objects, Assignments and Initialization, subscripting, function call, dereferencing, increment and decrement, A string Class, Friends and members.

5. **Inheritance through Extending Classes:** Concept of Inheritance, Base Class, Derived Class, Definig derived classes, Visibility modes, single inheritance.

6. **Streams, Templates and Design of Libraries:** Output, Input, Formatting, Files and Streams, C-I/O, Design of Libraries.

7. **Object Oriented Analysis & Design:** Object Oriented Analysis, System Design, Object Design, Semantic & Entity, Relationship & Modeling, Overview of Existing Methodology. Booch's OOA and OOD Approach.

IV Paper: Data Communication & Computers Networks

Data Communication System:

Purpose, Components: Source, transmitter, transmission System, receiver and destination, Data transmission: Frequency, Spectrum and Bandwidth, Analog and digital data transmission, Data and signal, Analog and digital signaling of analog and digital data, Modem, Modulation techniques, CODEC, Digital transmitter etc. Transmission impairments: Attenuation and attenuation distortion, delay distortion, noise, Introduction to network, OSI reference model, TCP/IP reference model, Transmission Media: Magnetic media, Twisted-Pair cables, Baseband & Broadband Coaxial cables, Fiber optics.

Wireless Transmission:

Radio Transmission, Microwave Transmission, ISDN, ATM, Data Link Layer: Services, Framing, Error Control, Error-detecting & Correcting Codes, Data Link Protocols: Stop-and-wait Protocol, Sliding Window Protocol.

HDLC:

Static & Dynamic Channel allocation in LANs & MANs

Multiple Access Protocols:

ALOHA, CSMA/CD, IEEE-standards 802.3 and Ethernet, 802.4, Token Bus, 802.5 Token ring, Bridges, Routers, Gateways, Routing algos, Congestion control algos, Internetworking. The TCP/IP Protocol, IP Addressing, Subnets.