PATLIPUTRA UNIVERSITY

SYLLABUS

For

BACHELOR OF SCIENCE-INFORMATION TECHNOLOGY

(B.SC.-IT)

PATLIPUTRA UNIVERSITY

BACHELOR OF SCIENCE-INFORMATION TECHNOLOGY (BSc-IT)

Part	Paper	Section	Subject/Topic
I	I	A	FUNDAMENTALS OF INFORMATION TECHNOLOGY
		B	STRUCTURED PROGRAMMING USING 'C' LANGUAGE
		C	INTRODUCTION TO IBM ARCHITECTURE
	II	A	DATABASE MANAGEMENT SYSTEM
		B	OPERATING SYSTEM CONCEPTS - DOS, WINDOWS, UNIX
		C	BASIC ELECTRONICS
II	I	A	DATA STRUCTURE
		B	DISCRETE MATHEMATICS
		C	LINUX OS
	II	A	OBJECT ORIENTED PROGRAMMING USING C++
		B	COMPUTER NETWORK & INTERNET
		C	DIGITAL COMPUTER ORGANISATION
III	I	A	JAVA PROGRAMMING
		B	INTERNET & WEB DESIGNING
		C	INTRODUCTION TO NETWORK SECURITY
	II	A	VISUAL PROGRAMMING WITH VB
		B	SQL SERVER
		C	INTRODUCTION TO SYSTEM ANALYSIS DESIGN

PAPER-I

<u>SECTION-A</u>

(FUNDAMENTALS OF INFORMATION TECHNOLOGY)

UNIT-I (HARDWARE)

- Brief History of Development of Computers.

- Computer System Concepts Features & Limitations.

- Basic components of Computer Hardware, CPU, Memory Unit & I/O Unit.

- CPU Organization - CU, ALU, Registers.

- Memory Organisation - RAM, ROM, EPROM, PROM, Cache Memory.

- I/O Organisation - VDU, Keyboard, Mouse and Secondary I/O Devices.

- Mass Storage Organisation - Magnetic Tape, Magnetic Disk, CD, DVD, Flash Storage Device.

- Data Representation - Number Systems - Binary, Decimal, Octal, 2's complement, ASCII & EBCI codes.

UNIT-II (INTRODUCTION TO SOFTWARE)

- Types of Software.

- System Software - Operating Systems, Command Interpreters, Translator - Assembers, Compilers, Interpreters.

- Types of Operating Systems - Batch processing, Single process monitors, Multiprogramming - Real time, Online, Multiprocessing.

- Programming Languages - Machine language, Assembly language, High level languages.

- Application packages - Word processors, Spread sheet, Presentations, Other utilities.

- Computer viruses - Working & spread of viruses, Types, Control of viruses.

- Communication & Transmission

- Analog & Digital Signals

- ☐ Modulation - Demodulation (MODEM)
- ☐ Transmission Mode - Simplex, Half Duplex, Duplex
- ☐ Line Configuration - Point to Point, Multipoint
- ☐ Definition of Computer Networks
- ☐ Types - LAN, WAN & MAN
- ☐ Topologies
- ☐ Communication Protocols

Reference Books
- Computers Today - S.K. Basandra - Galgotia Publication
- Fundamental of Information Technology - Alexis Leon & Mathews Leon - Vikas Publishing House
- Computer Fundamentals - P.K. Sinha - BPB Publications

SECTION-B

(STRUCTURED PROGRAMMING USING 'C' LANGUAGE)

UNIT-I (PROGRAMMING CONCEPTS)
- ☐ Programs & Program Development
- ☐ Flow Charts
- ☐ Pseudo Codes
- ☐ Programming Techniques - Structured Programming, Top-down approach, Bottom-up approach, Object Oriented Programming

UNIT-II ('C' PROGRAMMING LANGUAGE)
- ☐ Overview - History & Features
- ☐ Structure of a 'C' Programme
- ☐ Variables, Expressions, Identifiers, Keywords, Data types & Constants Operators - Arithmetical, Logical, Relational, Conditional & Bitwise
- ☐ Operators Precedence & Associativity
- ☐ 'C" - I/O - Character Based & Formatted
- ☐ 'C' Control Statements - Decision Control, If, If-else, nested If-else; Loops / Iteration - while, do-while, for-loops; Break / continue / goto statements; Single & Multi Dimensional
- ☐ Arrays
- ☐ Strings
- ☐ Functions - Call by Value & Call by Reference
- ☐ Introduction to pointers
- ☐ Recursion
- ☐ Structure & Unions
- ☐ C - Files

Reference Books
- Programming in 'C' - E. Balaguruswamy, TMH Publication.
- Programming with 'C' - Gottfried, Schaums Series, TMH Publication.
- 'O' Level Programming Concepts & Systems - V.K. Jain - BPB Publication
- 'C' Complete Reference - Herberg C, TMH Publication.

SECTION-C

(INTRODUCTION TO IBM ARCHITECTURES)
- ☐ Microprocessors & Microprocessor Families
- ☐ Personal Computers - IBM & Apple Series
- ☐ IBM PC Characteristics - PC/PCAT/PCXT
- ☐ 8086 Architecture
- ☐ DMA Controller & Configuration
- ☐ VGA Controller
- ☐ Arithmetic Co-processor
- ☐ Clocks

Reference Books
- IBM PC - Peter Norton
- Computer Organisation & Architecture - William Stallings - TMH Publication

PAPER-II

SECTION-A

(DATABASE MANAGEMENT SYSTEMS)

UNIT-I (DBMS BASICS)
- ☐ DBMS Vs Files
- ☐ Organisation of DBMS
- ☐ Three Views & Schemas of DBMS
- ☐ Three Views & Schemas of DBMS
- ☐ DOL, DML, Queries, SQL
- ☐ Types of DBMS - Relational, Hierarchial & Network
- ☐ E-R Diagrams
- ☐ Generalisation, Specialisation, Aggregation

☐ **UNIT-II (RDBMS)**

- ☐ Relation - Definition, Functional Dependency Domain, Attributes, Tuples, Fields
- ☐ Keys - Candidate key, Primary key, Foreign key
- ☐ Codd's Rules
- ☐ Normalisation upto BCNF
- ☐ Example RDBMS - ORACLE (Practical Classes)

Reference Books

- Database System Concept - Korth & Silberschartz - TMH Publication
- An Introduction to Database System -Bipin Desai
- Database Management System - Leon & Leon - Vikas Publication
- An Introduction to Database System - C.J. Date - Pearson Education.

SECTION-B

(OPERATING SYSTEM CONCEPTS)

UNIT-I (OS BASICS)

- ☐ Define OS
- ☐ Functions of OS
- ☐ Types of OS

UNIT-II (PROCESS MANAGEMENT)

- ☐ Process Definition
- ☐ PCB, Process States
- ☐ Scheduling - Algorithms & Types
- ☐ FCFS, SJF, Round Robin
- ☐ LTS, STS, MTS
- ☐ Premtive & Non-Premtive Scheduling
- ☐ Deadlocks - Avoidance, Detection & Recovery
- ☐ Interprocess Synchronisation - Semaphores & Mutual exclusion

UNIT-III (MEMORY MANAGEMENT)

- ☐ Fixed & Dynamic Partitions
- ☐ Compaction
- ☐ Paging
- ☐ Segmentation
- ☐ Virtual memory, Page Replacement Algorithms

UNIT-IV (DEVICE MANAGEMENT)

- ☐ Overview - Types of I/O - Serial & Block I/O
- ☐ Programmed I/O
- ☐ Interupt Driven I/O
- ☐ DMA (Direct Memory Access)
- ☐ Polling, Daisy-Chaining, Multiple Interrupt lines
- ☐ Device Drivers & Device Controllers, BIOS, IS < Device Independent Software

UNIT-V (FILE MANAGEMENT)

- ☐ Clocks, Sectors, Clusters, Directories
- ☐ Files - Concepts & Definitions
- ☐ Types of Files & Organisation
- ☐ Disk Free Space Management
- ☐ Disk Free Space Allocation
- ☐ Disk Scheduling

UNIT-VI (DISK OPERATING SYSTEM - DOS)

- ☐ History & Versions
- ☐ Booting - FAT, Directory Structure
- ☐ DOS System Files
- ☐ DOS Commands - Internal & External
- ☐ DOS - Batch Files
- ☐ DOS Commands - Internal & External
- ☐ DOS - Batch Files

Reference Books

- Operating System Concept - Galvin & Silberschatz - Wiley India
- Operating System - Tannenbaum - Pearson Education
- Operating System - Dietel & Dietel - Pearson Education

SECTION-C

(BASIC ELECTRONICS - I)

UNIT-I

- ☐ Types of resistance, Resistance symbol, Color code capacitors, Capacitors symbol, Code types, Mica & paper capacitor, Inductance, Conductor, Insulator, Band theory, Intrinsic & Extrinsic semiconductors, Theory of p-n junction, Capacitance & Diffusion capacitance.

UNIT-II
☐ Zener diode, Tunnel diode, Varactor diode, Power diode, Photo diode, LED, LCD, Point contract diode, Schottky diode, Halfwave & Fullwave rectifier with & without filter.

UNIT-III
☐ BJT Characteristics, CE, CB, CC configurations, FET metal oxide, Semiconductors (MOSFET), CMOS, Unijunction transistor & Photo transistor.

UNIT-IV
☐ Single stage RC coupled amplifier frequency response class A, class B, class AB, class C, Push pull amplifier, Efficiency distortion in amplifier their merits and demerits, BJT & FET RC coupled amplifiers.

UNIT-V
☐ Switching Characteristics BJT & FET, Monostable & Astable Multivibrators, RC integrators & differentiators, Clipper & Clamber circuit.

Reference Books
● Basic Electronics - B.L. Thareja - S. Chand
● Basic Electronics - A.K. Sahani - Dhanpath
● Basic Electronics - V.K. Mehta - S. Chand
● Basic Electronisc - J.B. Gupta

SECOND YEAR
PAPER - 1

SECTION - A : DATA STRUCTURE
☐ Dynamic Memory Allocation - Malloc ( ) Calloc ( )
☐ Analysis of Algorithms
☐ Arrays - Searching, Sorting, Insertion, Deletion, Merging
☐ String, Manipulation
☐ Linked Lists - Single & Double, Operations
☐ Sparse Matrices, Operations
☐ Stacks - Operations, Infix, Prefix & Postfix Notations
☐ Queues - Operations, Circular & Deque
☐ Trees - BS Tree, AVL - Tree, B-Tree, Heap Searching & Sorting Techniques
☐ Graphs - Adjencency, DFS, BFS, Minimum Spanning Tree, Dgikistra & Kruskals Algorithms.

SECTION - B : DISCRETE MATHEMATICS
Unit - I : Boolean Algebra
☐ Introduction to Boolean Algebra
☐ Basic Postulates
☐ Canonical Forms - Sum of Products & Product of Sums
☐ Karnaugh Maps
☐ Simplification using Karnaugh Maps

Unit - II : Circuit Design
☐ Introduction to Digital Logic
☐ Gates - Invertors, AND, OR, XOR, UNIVERSAL NAND GATE, UNIVERSAL NOOR GATE, TRUTH TABLES AND LOGIC DIAGRAMS
☐ Basic Circuits - Adders, Decoders, Encoder, Multiplexers, Flip-flops etc.

SECTION - C
Unit - I : LINUX
☐ Basic features, Advantages, Basic, Architecture of Unix, Linux System, Kernell, Shell
☐ Linux File System-Boot Block, Super Block, Inode Tabl, Data Blocks, How Linux access files, storage files, Linux standard, Directories, Commands for files and directories CD, Is, cp, md, rm, mkdir, rmdir, more, less, creating and viewing files, using cat, checking disk free spaces, Linux system startup and shut-down process.

Unit - II : LINUX
☐ Understanding shells, Processes in Linux, Connecting processes with pipes, Redirecting input, output, Background processing, Managing multiple processes, Changing process priority, Scheduling of processing at command, Batch commands, Kill, ps who, sleep, Printing commands, find, sort, cal, banner touch, file related commands-ws, sat, cut, grep, dd, etc. Mathematical commands-bc, expr, factor, units.

PAPER - 2
SECTION - A : OBJECT ORIENTED PROGRAMMING USING C++
Unit - I : Oops Basics
☐ Objects
☐ Classes
☐ Polymorphism
☐ Reusability
☐ Inheritance
☐ Message
☐ Passing
☐ Genericity

Unit - II
☐ History & Features, Introduction of Classes, Comprasion / Additional Features to C-Language
☐ Object Oriented Features in C++
☐ Scope ResolutionOperator
☐ Static DataMember
☐ static Function
☐ Passing Object of Function
☐ Returning Objects
☐ Constructors &Distributors
☐ Function Overloading in C++, Operator Overloading in C++
☐ Inline Function, Friend Function
☐ Inheritance - Single, Multiple, Multilevel Virtual Functions
☐ Void Pointers
☐ Pure VirtualFunctions
☐ Function Templets & Class Templets

SECTION - B : COMPUTER NETWORKING & INTERNET
Unit - I
☐ Need & Advantages of Networks, Types : Server based, Peer based, Hybrid
☐ Topology, Network media types, H/w protocol, Software protocol, Digital signaling, Analog, Signaling bit synchronization, Base band and Broadbandtransmission.

Unit - II
☐ OSI and IEEE 802 Model, IEEE 802.3, IEEE 802.4, IEEE 802.5 & Fast ethernet FDDI, ATM, LAN access techniques, Bit map protocol

Unit - III
☐ Connectivity, Hubs, Repeaters, Bridges, Multiplexers, Router, Gateways, Modem, Types of Modem, Modulation Schemes

Unit - IV
☐ Internet Vs Intranet, Growth of Internet, ISP, Connectivity, Dial-up, Leased line, URL, Domain name portals application, POP & Web based email, merits, IP addressing
☐ Basics of sending and receiving e-mails

Unit - V
☐ Internet Chatting, www, http, url, html
☐ Overview of e-commerce, Internet, e-business, advantages of e-commerce.

SECTION - C : DIGITAL COMPUTER ORGANISATION
Unit - I
☐ CUP Organisation : ALU & Control Circuit, Idea about Arithmetic, Circuits, Program Control, Instruction Sequencing

Unit - II
☐ INPUT-OUTPUT ORGANIZATIONS : I/O Interface, Properties of simple I/O devices and their controller, Isolated versus memory-mapped, I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O processor.

Unit - III
☐ MEMORY ORGANIZATION : Memory Hierarchy, Auxiliary memory, Magnetic drum, Disk & Tape, Semi-conductor, Memories, Associative, Memory, Virtual memory, Address space & Memory space, Address mapping, Page table, Page replacement, Cache memory, Hit ratio, Various mapping techniques, Writing into cache.

THIRD YEAR

PAPER - 1

SECTION - A : JAVA PROGRAMMING

Unit - I
☐ C++ Vs Java, Java and Internet and www, Java support systems, Java environment, Java program structure, Tokens, Statements, Java Virtual Machine, Expressions and its evaluation, Data types, Type casting, Operators, Expressions & its evaluation, Decision making and branching, Loops, Jumps in Loops, Labeled loops.

Unit - II
☐ Defining a class, Adding variables and method, Creating objects, Assessing class members, Constructors, Method overloading, Static members, Nesting of methods, Inheritance : Extending a class, Overriding methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes. Visibility control.

Unit - III

□ Arrays, One dimensional and two dimensional, Strings, Vectors, Wrapper classes, Defining interfaces, Extending interfaces, Implementing interfaces, Accessing interface variables, System packages, Using system packages, Naming conventions, Creating packages, Assessing a packages, Using package, Adding a class to a package, Hiding classes.

Unit - IV

□ Threads, Creating threads, Extending the threads class, Stopping and blocking a thread, Life cycle of a thread, Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing the runnable interface.

Unit - V

□ Applets, Local and remote applets, Applets vs applications, Writing applets, Applets life cycle, Creating an executable applet, Designing a web page, Applettage, Adding applet to HTML file, Running the applet, Passing parameters to applets, Aligning the display, HTML tags and applets, Getting input from the user.

SECTION - B : INTERNET AND WEB DESIGNING

Unit - I

□ Introduction to Internet Applications : Introduction to Internet, www, News group, E-mail, Messaging Protocols, Internet Protocols (Http, FTP, TFTP, DNS, SMTP, IMAP, POP andTCP/IP), Setting-up Internet connecting using dial-up and leased-line (Broadband). Creating E-mail... Sending mails, Attachments, using FTP services.

Unit - I

□ Introduction to Internet Applications : Introduction to Internet, www, News group, E-mail, Messaging Protocols, Internet Protocols (Http, FTP, TFTP, DNS, SMTP, IMAP, POP andTCP/IP), Setting-up Internet connecting using dial-up and leased-line (Broadband). Creating E-mail... Sending mails, Attachments, using FTP services.

Unit - III

□ Server side programming using ASP : ASP objects, DOM, Database accessing on Web, Using forms for perform query in Databases.

SECTION - C : INTRODUCTION TO NETWORK SECURITY

Unit - I

□ Introduction : Networking Terminologies, Active Vs Passing Attacks, Viruses, Worms, Trojan Lorser. The multi level model of security, Legal issues, Introduction, Breaking an encryption scheme, Types of cryptographic functions-Secred key, Public key and Hash algorithms. Data encryption standards, International data, Encryption algorithm, Advanced Encryption Standard, Rc4 Modes of Operation, Encrypting a large message, Generating MACs, Multiple Encryption DES, Public Key Algorithm, Modular Arithmetic, RSA, Diffie-Hellman, Digital Signature Standard.

Unit - II

□ Authentication : Password based, Address based, Cryptographic authentication protocols, Eavesdropping and Server Database Reading, Trusted Intermediaries, Session key, Authentication of people security Handshake pitfalls, Electronic Mail Security, PGP (Pretty Good Privacy). Firewalls, Web-issues.

PAPER - 2

SECTION - A : VISUAL PROGRAMMING WITH VISUAL BASIC

Unit - I

□ **Visual Programming :** The Fundamental of Visual Basic, Introduction, VB Editions, Working with Visual Basic, IDE, The elements of the user-interface, Designing the user interface, Programming an application, Visual Development and Event-Driven Programming, Customization theEnvironment.

□ **Visual Basic the Language :** Visual basic projects, the project files, variables, constants, Array collections, procedures, arguments, function returns values, control flow statements, looping statements, nested control structures, exit statements.

□ **Working with Forms :** The appearance of the form, designing menus, building dynamic form drag and drop operations, mouse conflicts.

□ **Basic Active X Controls :** The textbox control, the list box and combo box controls, the scroll box and slider controls, the file controls.

□ **Advanced Active X Controls :** The common dialogs control, using the common dialog control the tree view and list view controls, the rich text box control, the RTF language, the msflexgrip control.

□ **Multiple Document Interface :** MDI applications, parent and child MDI forms, Accessing chii forms, Implementing scrolling forms.

□ **Database Programming with VB :** The Active date objects, data environment, sql, mshflexgrip, control, ado, Dao, Library, Report designing using data report, Interfacing with MS-Access & Oracle database.

SECTION - B : SQL SERVER

Unit - I

- **Introduction :** SQL Server 2000 Relational Database Management System and Conventions Database Systems. Installing SQL Server. Working with Enterprise Manager. Configuring a Database Creating Tables, Views, Defining constraints, Creating relationships. Designing Database Diagram, Creating Indexes, Creating user-defined data types, Creating Stored Procedures and Functions.
- Working with Query Analyzer, Writing queries, Using relational operators like project, join Intersect-union, difference. Built-in SQL functions. Performing data manipulation from query analyzer. Query optimization.
- Using OLE DB, ADO for interfacing with front-end applications designs in VB, Java etc.

SECTION - C : SYSTEM ANALYSIS & DESIGN

Unit - I

- **SYSTEM CONCEPTS :** The system concept, Characteristics of system, Elements of system, Types of system, Man-made information systems.
- **SYSTEM DEVELOPMENT LIFE CYCLE :** Recognition of need, Feasibility study, Analysis, Design, Implementation, Post implementation and Maintenance System planning and control.
- **SYSTEM PLANNING AND INITIAL INVESTIGATION :** Bases for planning system analysis, Determining users requirements and analysis, Fact finding, Determination of feasibility.
- **TOOLS OF STRUCTURED ANALYSIS :** Logical and Physical Models, Data flow diagram, Data dictionary, System structured charts, System model, Pseudo codes, Decision tree, Decision tables, HIPO chart, Gantt charts, Warries diagram.
- **FEASIBILITY STUDY :** System performance constraints, identification system objectives, feasibility analysis and report.
- **SYSTEM DESIGN :** Stages of system design, Logical and Physical design methods, From driver mythologies; IPO and HIPO charts, structured walk through, Audit considerations : Processing controls, Data validation, Audit trail and documentation control.