# VIKRAM UNIVERSITY, UJJAIN

## SYLLABUS

## SEMESTER WISE SCHEME

## BACHELOR OF SCIENCE
## SUBJECT: COMPUTER SCIENCE
**( 3 Years- 6 Semesters )**

## B.Sc. Part – I, II & III
**(With Subject: Computer Science)**

## 2010-2011

**and**

## Onwards

# B.Sc.-Part-I Semester Wise Scheme
**(With Subject: Computer Science)**

## Semester – I

| Course | Theory Max. Marks | CCE | Max. Marks |
|---|---|---|---|
| **B.Sc.-CS-101 Introduction to Information Technology** | 35 | 15 | 50 |
| **B.Sc.-CS-102 Programming and Problem Solving in C** | 35 | 15 | 50 |
| **B.Sc.-CSP101 Practical (Based on B.Sc.-CS-102 )** | 35 | 15 | 50 |

## Semester – II

| Course | Theory Max. Marks | Practical Max. Marks | Max. Marks |
|---|---|---|---|
| **B.Sc.-CS-201 Operating Systems** | 35 | 15 | 50 |
| **B.Sc.-CS-202 Digital Electronics** | 35 | 15 | 50 |
| **B.Sc.-CS P201 Practical ( Based on B.Sc.-CS-201 )** | 35 | 15 | 50 |

# B.Sc.- Part-II Semester Wise Scheme
**(With Subject: Computer Science)**

## Semester – III

| Course | Theory Max. Marks | Practical Max. Marks | Max. Marks |
|---|---|---|---|
| **B.Sc.-CS-301 Data Structures** | 35 | 15 | 50 |
| **B.Sc.-CS-302 Data Communication and Computer Networks** | 35 | 15 | 50 |
| **B.Sc.-CSP301-Practical (Based on B.Sc.-CS-301 )** | 35 | 15 | 50 |

## Semester – IV

| Course | Theory Max. Marks | Practical Max. Marks | Max. Marks |
|---|---|---|---|
| **B.Sc.-CS-401 Programming with Visual Basic** | 35 | 15 | 50 |
| **B.Sc.-CS-402 Data Base Management System** | 35 | 15 | 50 |
| **B.Sc.-CS-P401- ( Based on B.Sc.-CS-401 )** | 35 | 15 | 50 |

# B.Sc.- Part-III Semester Wise Scheme
**(With Subject: Computer Science)**

**SEMESTER: V**

| PAPER CODE | PAPER NAME | MARKS | | |
|---|---|---|---|---|
| | | EXTERNAL | INTERNAL | TOTAL |
| **B.Sc.-CS-501** | **INTERNSHIP PROJECT** | 150 | 150 | 300 |

## Semester – VI

| Course | Theory Max. Marks | Practical Max. Marks | Max. Marks |
|---|---|---|---|
| **B.Sc.-CS-601 Computer Graphics & Multimedia** | 35 | 15 | 50 |
| **B.Sc.-CS-602 Programming With JAVA** | 35 | 15 | 50 |
| **B.Sc-CS-P601 Practical ( Based on B.Sc.-CS-602 )** | 35 | 15 | 50 |

# B.Sc. - I Semester
# (Computer Science)

## B.Sc.-CS -101 Introduction to Information Technology

**Unit-I**

Basic concepts of Information Technology, Concepts of Data and Information, data processing, History of computers, organization of computers, input and output devices, storage devices and file organization.

**Unit-II**

System software, application software, utility packages, compilers, interpreters, operating Systems, Elementary commands of DOS, Windows and Unix operating systems (file handling, directory management and general purpose user interfacing commands)

**Unit-III**

**M**achine language, assembly languages, high level languages, forth generation Languages, General concepts of OOPS (Object oriented programming) and SQL (Structured Query Languages).

**Unit-IV**

Communication system elements, Communication modes (Analog and digital, synchronous and asynchronous, simplex, half duplex and full duplex, circuit switching and packet switching), Communication media: (speed and capacity, twisted pair, coaxial fiber optics, wireless), common network components, hosts and servers, work-stations, network topologies and network protocols(ISO/OSI Ref Model and TCP/IP).

**Unit-V**

Application of IT in business, industry, home, education and training, Entertainment, science and engineering and medicine, multimedia data types(graphics, images, audio, video), virtual reality applications, Internet, World Wide Web(WWW), Domain names, e-mail, teleconferencing, e-commerce, hypermedia, data warehousing.

**Books**

1. Rajaraman V. "Fundamental of Computers" (2nd edition). Prentice Hall of India, New Delhi
2. Sanders. D.H. "Computers Today "McGraw Hill, 1988.
3. S. Jaiswal, “Information Technology Today”, Galgotia Pub., New Delhi, 1999.

## B.Sc.-CS-102 Programming and Problem Solving in C

**Unit-I**
Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

**Unit-II**
History of C; Structure of a C Program; Data types; Constant & Variable; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

**Unit-III**
Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

**Unit-IV**
Special constructs – Break, continue, exit(), goto & labels; Pointers - &and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments.

**Unit-V**
File handling and related functions; printf & scanf family;C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

Books :

1. Kerninghan & Ritchie: The C programming language, PHI
2. Cooper Mullish: The Spirit of C, Jaico Publishing House, Delhi
3. Kanetkar Y.: Let us C
4. Kanetkar Y.: Pointers in C

# B.Sc. - II Semester
# (Computer Science)

## B.Sc.-CS-201 Operating Systems

**Unit I**

Introduction to Operating Systems, Operating system services, multiprogramming, time-sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/0 devices organization, I/0 devices organization, I/0 devices organization, I/0 buffering.

**Unit II**

Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

**Unit III**

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation.

***Unit IV***

Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system.

***Unit V***

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

**Books**

i. Operating System by Silberschatz
ii. Operating System by Deitel
iii. Modern operating system by Tanneubacem.

## B.Sc.-CS- 202 Digital Electronics

**Unit- I**

Data types and Number systems, Binary number system, Octal & Hexa-decimal number system,1's & 2's complement, Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes

**Unit – II**

Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demorgan's theorem, MAP Simplification, Minimization techniques, K-Map, Sum of Product & Product of Sum

**Unit – III**

Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor, Flip-flops - RS, D, JK & T Flip-flops, Shift Registers, RAM and ROM, Multiplexer, Demultiplexer, Encoder, Decoder, Idea about Arithmetic Circuits, Program Control, Instruction Sequencing

**Unit – IV**

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 – V**

Auxiliary memory, Magnetic Drum, Disk & Tape, Semi-conductor memories, Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address Mapping, Page table, Page Replacement, Cache Memory, Hit Ratio, Mapping Techniques, Writing into Cache.

**Books :**

1. BARTEE, “Digital Computer Fundamentals ” TMH Publication
2. MALVINO, “ Digital Computer Electronics ” TMH Publication
3. MORRIS MANO, “Computer System Architecture ” PHI Publication

# B. Sc.- III Semester
## (Computer Science)

## B.Sc.-CS-301 Data Structures

**Unit-I**

The concept of data structure, Abstract data type, Concept of list & array Introduction to stack, Stack as an abstract data type, primitive operation on stack, Stacks application: Infix, post fix, Prefix and Recursion, Multiple Stack. Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular queue, Dequeue, Priority queue, Applications of queue

**Unit –II**

Introduction to the Linked List , Basic operations on linked list, Stacks and queues linked list, Header nodes, Doubly Linked List, Circular Linked List, Stacks & Queues as a Circular Linked List, Application of Linked List.

**Unit –III**

TREES - Basic Terminology, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Application of Binary tree, Threaded binary tree, B-tree & Height balanced tree, Binary tree representation of trees.

**Unit –IV**

Analysis of algorithm, complexity using big 'O' notation. Searching: linear search, Binary search, their comparision. Sorting :Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.Hash Table, Collision resolution Techniques.

**Unit –V**

Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal-Depth first & Breadth first search. Spanning Trees, minimum spanning Tree, Shortest path algorithm

Books :

1. Fundamentals Of Data Structure, By S. Sawhney & E. Horowitz
2. Data Structure : By Trembley & Sorrenson
3. Data Structure : By lipschuists (Schaum's Outline Series Mcgraw Hill Publication)
4. Fundamentals Of Computer Algorithm: By Ellis Horowitz and Sartaj Sawhney

## B.Sc.-CS-302 Data Communication and Computer Networks

**Unit I**

Introduction Theoretical Model for Communication, analog and digital signal, Bandwidth, Noise, Channel Capacity, Data-rate, Concepts of Circuit Switching, Message switching and Packet switching with their timing diagrams, comparison of switching techniques, ISDN.

**Unit II**

Evolution of Computer Networks - Layered Network architecture, OSI Layers Model, transmission media - topology, error detection & Correction techniques, Parity checks, CRC, Asynchronous and synchronous transmission, TDM, FDM.

**Unit III**

Data-Link layer: Different Types of line discipline, simplex, Half duplex and full duplex, Flow control; stop and wait protocol, sliding Window Protocol With their efficiency, ARQ techniques & their performance, HDLC.

**Unit IV**

LAN: Static & Dynamic channel allocation, Media access control for LAN & WAN; ALOHA : pure, slotted ALOHA, CSMA, CSMA/CD IEEE 802 standards for LAN & MAN: 802.3, 802.4, 802.5, 802.6 and 802.2 & their comparison Fast LANs: fast Ethernet, FDDI

**Unit V**

Routing: Definition, Elements of routing techniques, Least Cost Routing algorithm Dijkstra's algorithm, Bellman-ford algorithm, Routing Strategies, Congestion Control encryption & description techniques, Internet working, Internet and Intranet

**Books**

1. Computer Networks - Tanenbaum A. S. PHI.
2. LANs - Keizer
3. Computer Networks - Stalling W., PHI.

# B.Sc.- IV Semester
## (Computer Science)

## B.Sc.-CS-401 Programming with Visual Basic

**Unit-I**

Basic of Visual Basic : The Integrated Development Environment : The Menu Bar, The Toolbars,The Project Explorer, The Toolbox , The Properties Window, Your First/VB Project : Remaining and Saving the Project. The Elements of the User Interface . Programming an Application : Programming the command Buttons, Grouping Controls. Visual Development and Events-Driven Programming : A Few common Properties , A Few Common Methods, A Few Common Events .

**Unit- II**

Customizing the Environment : The Editor Tab, The Editor Format Tab, The General Tab, The Docking Tab, The Environment Tab, The Advanced Tab. Visual Basic Projects : Building a Loan Calculator : Deciding How the Loan Application Works, Design the User Interface, Programming the Loan Application, Validating the Data. Building a Math Calculator : Designing the User Interface, Programming the Math Application, Adding More Features, Error Trapping. A Project's Files : The Project File, The Form File, Moving and Copying Projects, Executable files.

**Unit- III**

Visual Basic : The Language. Variables : Declaring Variables, converting Variable Types, User-Defined Data Types, Special Values, Examining Variable Types, Forcing Variable Declarations, A Variable Declarations, A Variable's Scope The Lifetime of a Variable. Constants . Arrys : Declaring Arrays, Specifying Limits, Multidimensional Arrays, Dynamic Arrays, Arrays of Arrays.

**Unit- IV**

Procedures : Subroutines, Functions , Calling Procedures Arguments : Argument-Passing Mechanisms, Using Optional Arguments, Passing an Unknown Number of Arguments, Named Arguments. Function Return Values : Functions Returning Custom Data Types, Functions Return Values Control flow Statements : If ... Then, If ... Then ... Else , Select Case, Loop Statements : Do Loop, For Next, While Wend, Nested Control Structures, The Exit Statement.

**Unit- V**

Working with Forms : An Application with Multiple Forms : The Startup Object The Appearance of Forms : The Start-Up Form, Loading, Showing, and Hiding Forms, Controlling One Form from within Another. Designing Menus : The Menu Editor, Programming Menu Commands, Building Dynamic forms at Runtime Drag-and-Drop Operations : The DragMode Property , TheDrag-Drop and DragOver Methods.

Book :

1. Mastering in Visual Basic 6

## B.Sc.-CS-402 Data Base Management System

**Unit I**

DBMS Concepts and architecture Introduction, Review of file organization techniques, Database approach v/s Traditional tile accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Functions of DBA and designer. Entities and attributes, Entity types, Value, Sets, Key attributes, Relationships, Defining the E-R diagram of database, Various data models : Basic concepts of Hierarchical data model, Network data model, and Relational data model, Comparison between the three types of models.

**Unit II**

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints, Intension and Extension, Relational Query languages: Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union etc.

**Unit III**

Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations. SQL: Data definition in SQL, update statements and views in SQL QUEL & QBE: Data storage and definitions, Data retrieval queries and update statements etc.

**Unit IV**

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and losless join, problems with null valued and dangling tuples, multivalued dependencies. Distributed databases, protection, security and integrity constraints, concurrent operation on databases, recovery, transaction processing, basic concepts of object oriented data base system and design.

**Unit V**

Case study of relational database management systems: Oracle and Microsoft access, Oracle tools.

**Books :**

1. Data Base Management System by C.J. Date
2. Data Base Management System by Ullman
3. Fundamental of database system by Elmasri / Navathe the Benjamin / Cunnings Publishing company inc.
4. Data base design by Gio Wiederhold. McGraw Hill
5. Fundamental of Data Base Management System by Leon & Leon, Vikas Publishing House Pvt. Ltd.

# B.Sc. - VI Semester
## (Computer Science)

## B.Sc.-CS-601 Computer Graphics & Multimedia

**Unit I**

Introduction to Raster scan displays, Storage tube displays, refreshing, flickring, interlacing, colour monitors, display processors resolution, working principle of dot matirix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball , tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

**Unit II**

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Beizier Method, B-spline Method.

**Unit III**

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen.

**Unit IV**

Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

**Unit V**

Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools, presentation.

**Books :**

1. James E. Shuman, "Multimedia in Action" Thomson / Vikas Publishing House.
2. Tay Vaughan " Multimedia: making it work" Tata McGraw Hill 1999, 4th Edition
3. Prabhat k Andleigh, Kiran Thakral "Multimedia System Design", PHI
4. Donald Hearn and M.P. Becker "Computer Graphics" PIR Pub.
5. Folay Vandam,Feiner, Hughes "Computer Graphics Principle & Practice" Adison Wesley,2/e. 1997
6. Principles of Computer Graphics "Rogers" TMH.

## B.Sc.-CS-602 Programming With JAVA

**Unit-I**

C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment.JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators : Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions & its evaluation**.**If statement, if…else… statement, Nesting of if…else… statements, else…if Ladder, Switch, ? operators, Loops – While, Do, For, Jumps in Loops, Labelled Loops.

**Unit-II**

Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods.Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.

**Unit-III**

Arrays: One Dimensional & two Dimensional, strings, Vectors, wrapper Classes, Defining Interface Extending Interface, Implementing Interface, Accessing Interface Variable, System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

**Unit-IV**

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**

Local and Remote Applets Vs Applications, Writing Applets, Applets Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets, Getting Input from the User.

**Books :**

1. Balaguruswamy, “Programming In Java”, 2nd Edition, TMH Publications
2. “Peter Norton, Guide To Java Programming,Techmedia Publications