Bachelor in Computer Applications (BCA), Utkal University

Effective from 2016-17 Academic Session

SEMESTER	COURSE OPTED	COURSE NAME	CREDITS
I	Ability Enhancement Course-I	English/ M I L	2
	Core Course-I	Programming using C	4
	Core Course-I Practical	C LAB	2
	Core Course-II	Computer Organization	4
	Core Course-II Practical	Computer Organization LAB	2
	Generic Elective-I	Discrete Structures	4
	Generic Elective-I Practical	Discrete Structures LAB	2
II	Ability Enhancement Course-II	Environmental Science	2
	Core Course-III	Programming using C++	4
	Core Course-III Practical	C++ LAB	2
	Core Course-IV	Data Structures	4
	Core Course-IV Practical	Data Structures LAB	2
	Generic Elective-II	Numerical Techniques	4
	Generic Elective-II Practical	Numerical Techniques LAB	2
III	Core Course-V	JAVA Programming	4
	Core Course-V Practical	JAVA Programming LAB	2
	Core Course-VI	Computer Architecture	4
	Core Course-VI Practical	Computer Architecture LAB	2
	Core Course-VII	Operating System	4
	Core Course-VII Practical	Operating System LAB	2
	Skill Enhancement Course-I	HTML Programming	2
	Generic Elective-III	Statistics and Probability	4
	General Elective-III Practical	S&P LAB	2
IV	Core Course-VIII	Data Communication	4
	Core Course-VIII Practical	Data Communication LAB	2
	Core Course-IX	Database Systems	4
	Core Course-IX Practical	Database Systems LAB	2
	Core Course-X	Microprocessor	4
	Core Course-X Practical	Microprocessor LAB	2
	Skill Enhancement Course-II	PHP Programming	2
	Generic Elective-IV	Programming in Visual Basic	4
	General Elective-IV Practical	Visual Basic LAB	2
	Core Course-XI	Software Engineering	4

V	Core Course-XI Practical	Software Engineering LAB	2
	Core Course-XII	Computer Graphics	4
	Core Course-XII Practical	CG LAB	2
	Discipline Specific Elective-I	Accounting & Financial Management	4
	Discipline Specific-I Practical	AFM LAB	2
	Discipline Specific Elective-II	Programming in .NET	4
	Discipline Specific Elective-II Practical	.NET LAB	2
VI	Core Course-XIII	Internet Technology	4
	Core Course-XIII Practical	Internet Technology LAB	2
	Core Course-XIV	Multimedia & Applications	4
	Core Course-XIV Practical	Multimedia & Applications LAB	2
	Discipline Specific Elective-III	E-Commerce	4
	Discipline Specific Elective-III Practical	E-Commerce LAB	2
	Discipline Specific Practical Work	Project-Work	8

PROGRAMMING USING C

UNIT- I

Introduction to Programming Language, Introduction to C Programming , Character Set, C Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variables , Storage Classes, Operators (Arithmetic, Relational, Logical , Assignment, Increment & Decrement, Conditional , Bitwise), Expressions , Input and Output Operations.

UNIT- II

Decision Making and Branching: Simple IF Statement, IF ….. ELSE Statement, Nesting IF …. ELSE Statement, ELSE IF Ladder, Switch Statement, ?Operator, GOTO Statement. Decision Making and Looping: The WHILE Statement, The DO Statement, The FOR Statement, Jumps in LOOPS. Arrays, Character Arrays and Strings.

UNIT- III

User-defined Functions: Need, Elements & Definition, Function Calls, Function Definition, Category of Functions, Recursion. Structures and Unions: Defining, Declaring, Accessing, Initialization Structure, Arrays of Structures, Arrays within Structures, Structures and Functions, Unions.

UNIT- IV

Pointers: Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays,, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers to Structures, Troubles with Pointers.

UNIT- V

File Management in C: Defining and Opening a File, Closing a File, Input/ Output Operations on Files, Error Handling During I/O Operations, Random Access to Files, Command Line Arguments, Dynamic Memory Allocation.

Recommended Books:

1. E. Balaguruswamy, “Programming in ANSI C”,4/e, (TMH)
2. Paul Deitel, Harvey Deitel, "C: How to Program", 8/e, Prentice Hall.
3. J. R. Hanly, “Problem Solving & Program Design in C”, 7/e, Pearson
4. B. Kernighan & D.M. Ritche, “The C Programming Language”, 2/e PHI

COMPUTER ORGANIZATION

UNIT-I

Introduction: Organization and Architecture, Structure & Functions.

Number Systems: The Decimal System, Positional Number Systems, The Binary System, Converting Between Binary and Decimal (Integers, Fractions), Hexadecimal Notation.

UNIT-II

Computer Arithmetic: Arithmetic & Logic Unit, Integer Representation (Sign-Magnitude, Twos Complement, Range Extension, Fixed Point Representation), Integer Arithmetic (Negation, Addition and Subtraction, Multiplication, Division), Floating-Point Representation, (Principles, IEEE Standard for Binary Floating-Point Representation), Floating-Point Arithmetic (Addition and Subtraction, Multiplication and Division, Precision Considerations, IEEE Standard for Binary Floating-Point Arithmetic.

UNIT-III

Computer Evolution and Performance: History of Computers, Design for Performance (Microprocessor Speed, Performance Balance, Improvements in Chip Organization & Architecture), Multicore, MICs, and GPGPUs, Intel x86 Architecture, Embedded Systems and the ARM, Performance Assessment (Clock Speed and Instructions per Second, Benchmarks, Amdahl's Law, Little's Law.

UNIT-IV

Digital Logic: Boolean Algebra, Gates, Combinational Circuits (Implementation of Boolean Functions, Multiplexers, Decoders, Read-Only Memory, Adders), Sequential Circuits (Flip-Flops, Registers, Counters), Programmable Logic Devices (PLA, FPGA).

UNIT-V

Top-Level View of Computer Function and Interconnection: Computer Components, Computer Function (Instruction Fetch and Execute, Interrupts, I/O Function), Interconnection Structures, Bus Interconnection (Bus Structure, Multiple-Bus Hierarchies, Elements of Bus Design), Point-to-Point Interconnect (QPI Physical Layer, Link Layer, Routing Layer, & Protocol Layer), PCI Express (PCI Physical and Logical Architecture, PCIe Physical Layer, PCIe Transaction Layer, PCIe Data Link Layer).

Text Book:

William Stallings: Computer Organization and Architecture. 9/e

STATISTICS AND PROBABILITY

UNIT-I

Probability and Probability Distribution**:** Events and the Sample Space, Calculating Probabilities using Simple events, Useful counting rules, Probability rules: Addition rule, Conditional probability and multiplication rule, Bayes' rule.

UNIT-II

Probability Distributions**:** Random Variable, Discrete random variable, Mean and Standard deviation of discrete random variable, Discrete Probability Distributions: Binomial, Poisson and Hypergeometric probability distribution, Continuous Probability distribution: Normal distribution.

UNIT-III

Sampling Distribution**:** sampling plans and experimental designs, Sampling distribution of a statistic, Central Limit theorem, Sampling distribution of the Sample mean and Proportion.

Large Sample Estimation**:** Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.

UNIT-IV

Large Sample Tests of Hypothesis**:** Test of a Population mean, Test of difference of two population means, Test of hypothesis for a binomial proportion, Test of hypothesis for the difference between two binomial proportions.

Inference from Small Samples**:** Student's t Distribution, Small Sample inferences concerning a population mean and difference between two population means, Inferences concerning a population variance and difference between two population variances.

UNIT-V

Analysis of Variance**:** One-way classification, Two-way classification.

Linear regression and Correlation**:** Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearson's coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.

Recommended Books:

1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver**,** "Probability and Statistics" 14/e, CENGAGE Learning.

2. W. W. Hines, D.C. Montgomery, D.M. Goldsman, & C.M. Borror, “Probability & Statistics in Engineering"

PROGRAMMING USING C++

UNIT- I

Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP. Beginning with C++: Applications of C++, C++ statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking. Tokens, Expressions and Control Structures: Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Deferencing Operators, Memory Management Operators, Manipulators, Type Cast Operators, Expressions and their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

UNIT- II

Functions in C++: The Main Function, Function Prototyping, Call By Reference, Return by Reference, Inline Functions, Default Arguments, Const. Arguments, Function Overloading, Friend & Virtual Functions, Math. Library Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Cons. Member Functions, Pointer to Members, Local Classes.

UNIT- III

Constructors & Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Constructing Two-Dimensional Arrays, Const. Objects, Destructors. Operator Overloading and Type Conversions: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators using Friends, Manipulation of Strings using Operators, Rules for Overloading Operators, Type Conversions.

UNIT- IV

Inheritance : Defining Derived Classes, Single Inheritance, Making a Private Member Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes, Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT- V

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command-line Arguments.

Recommended Books;

1. E. Balgurusamy, Object Oriented Programming with C++ :, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program",9/e. Prentice Hall.
3. J. Farrell, “Object-Oriented Programming, Cengage Learning
4. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2/e, Addison-Wesley 2014

DATA STRUCTURE

UNIT-I

Introduction and Overview: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures. Arrays: Terminology, One-Dimensional Array, Multi-Dimensional Arrays, Pointer Arrays.

UNIT-II

Linked Lists: Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Application of Linked Lists, Memory Representation, Boundary Tag System, De-allocation Strategy, Buddy System, Compaction.

UNIT-III

Stacks: Definition, Representation of Stack (Array, Linked List), Operations on Stacks, Applications of Stack (Evaluation of Arithmetic Expressions, Code Generation,

Implementation of Recursion, Factorial Calculation, Quick Sort, Tower of Hanoi, Activation Record Management).

UNIT – IV

Queues: Definition, Representation of Queues (Array, Linked List), Circular Queue, Deque, Priority Queue, Application of Queues (Simulation, CPU Scheduling in Multiprogramming Environment, Round Robin Algorithm).

UNIT –V

Tree: Binary Trees, Properties of Binary Tree, Linear Representation of Binary a Binary Tree, Linked Representation of a Binary Tree, Physical Implementation of Binary Tree in Memory, Operations on Binary Tree (Insertion, Deletion, Traversal, Merging of two Binary Trees), Types of Binary Trees (Expression Tree, Binary Search Tree, Heap Tree, Threaded Binary Trees, Height Balanced Binary Tree, Weighted Binary Tree, Decision Trees).

Recommended Books:

1. D. Samanta, “Classic Data Structures”:, 2/e (PHI).
2. D.S Malik, “Data Structure using C++”, 2/e, Cengage Learning, 2010
3. Adam Drozdek, "Data Structures and algorithm in C++"*, 3/e*, Cengage Learning, 2012.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.

NUMERICAL TECHNIQUES

UNIT – I

Introduction**:** Numbers and their accuracy, Chopping and Rounding off, Errors: Absolute and Relative errors, Floating point representations of numbers, Loss of significance. Solution of Algebraic and Transcendental Equations**:** Bisection Method, Newton-Raphson Method, Secant Method, Method of false position, Rate of convergence and comparison of iterative methods.

UNIT-II

Interpolation and Numerical Differentiation**:** Polynomial Interpolation, Interpolating polynomial: Lagrange form, Newton form, Nested form, Divided difference Interpolation, Inverse Interpolation, Errors in polynomial Interpolation. First derivative and second derivative via Taylor Series, Richardson Extrapolation.

UNIT-III

Numerical Integration**:** Trapezoidal Rule, Composite Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gaussian Quadrature formulae (1-point, 2-point, 3-point)

UNIT-IV

Solution of System of Linear Equations**:** Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method.

Eigen Values and Eigen Vectors**:** Eigen value properties, Computation Eigen values by Power method.

UNIT - V

Solution of Ordinary Differential Equations**:** Taylor Series method, Runge-Kutta method of order 2 and order 4, Predictor-Corrector method: Adam's-Bashforth-Moultan method. Smoothing of Data and the Method of Least Squares**:** Linear and non-linear least square method.

Recommended Books:

1. E. Ward Cheney and David R. Kincaid **,**"Numerical Methods and Applications" CENGAGE Learning India Private Ltd., New Delhi.
2. S.R.K. Iyengar, R.K. Jain, & M.K. Jain, "Numerical Methods for Scientific & Engineering Computation", 6/e, New Age Int. Pub.
3. S.S. Sastry, " Introductory Methods of Numerical Analysis", 5/e, EEE
4. Steven C. Chapra, "Applied Numerical Methods with MATLAB", 2/e, McGraw-Hill.

OPERATING SYSTEMS

UNIT- I

Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems. Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations. System Boot.

UNIT- II

Process: Process Concept, Process Scheduling, Operations on Processes, Inter-Process Communication, Examples of IPC Systems, Communication in Client-Server Systems. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Operating-System Examples.

UNIT- III

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling. Multiple-Process Scheduling. Synchronization: The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions.

UNIT- IV

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Example: The Intel Pentium.

UNIT- V

Virtual-Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8/e, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3/e, Pearson Education 2007
3. W. Stallings, “Operating Systems, Internals & Design Principles”, 5/e, Prentice Hall of India. 2008
4. G. Nutt, “Operating Systems: A Modern Perspective”, 2/e, Pearson Education 1997.

DATABASE SYSTEMS

UNIT-I

Databases and Database Users, Database System Concepts and Architecture, Data Modelling using the Entity-Relationship(ER) Model, The Enhanced Entity-Relationship (EER) Model.

UNIT-II

Relational Model: The Relational Data Model and Relational Database Constraints, The Relational Algebra and Relational Calculus.

UNIT-III

Relational Database Design by ER- and EER-to-Relational Mapping, SQL-99: Schema Definition, Constraints, Queries, and Views, Introduction to SQL Programming Techniques.

UNIT-IV

Functional Dependencies and Normalization for Relational Databases, Relational Database Algorithms and Further Dependencies, Practical Database Design Methodology and use of UML Diagrams.

UNIT-V

Disk Storage, Basic File Structures, and Hashing, Indexing Structures for Files, Algorithms for Query Processing and Optimization, Physical Database Design and Tuning.

Recommended Books:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, 6/e, Pearson Education, 2010

2. A. Silberschatz, H.F. Korth, S. Sudarshan, “Database System Concepts” 6/e, McGraw Hill, 2010
3. R. Ramakrishanan, J. Gehrke, “Database Management Systems”, McGraw-Hill
4. C. Coronel, S. Morris, & P. Rob, “Database Principles (Fundamentals of Design, Implementation, and Management), 9/e, Cengage Learning.

DISCRETE STRUCTURES

UNIT-I Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Normal Forms, Proof Methods and Strategy, Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT-II Basic Structures: Sets, Set Operations, Functions, Recursive Functions, Sequences and Summations. Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Ordering. Boolean.

UNIT-III Algebra: Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits. Algebraic Structures & Coding Theory: The Structure of Algebras, Semi-groups, Monoids and Groups, Homomorphism, Normal Subgroups, and Congruence Relations, Rings, Integral Domains and Fields, Quotient and Product Algebras, Coding Theory. Polynomial Rings and Polynomial Codes.

UNIT-IV
Counting: Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations. Advanced Counting Techniques, Applications of Inclusion-Exclusion, Discrete probability, Conditional probability, Bayes’ Theorem.

UNIT-V Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Havel-Hakimi Theorem, Representing Graphs and Graph Isomorphism, Connectivity, Cut-Sets, Euler and Hamiltonian Paths, Shortest-Path Problem, Planar Graphs, Graph Coloring, Network Flows.

Recommended Books:

1. Kenneth H Rosen, Discrete Mathematics & Its Applications, McGraw-Hill. 7/e.
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
3. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988

JAVA PROGRAMMING

UNIT-I

Introduction to Java**:** Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

UNIT-II

Arrays, Strings and I/O**:** Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files. Object-Oriented Programming Overview**:** Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT-III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata**:** Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT-V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Recommended Books:

1. E. Balagurusamy, “ Programming with Java”, 4/e, TMH
2. Bruce Eckel, "Thinking Java", 8/e, Pearson India, 2010.
3. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2/e, 2004.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9/e,Printice Hall.2012.

COMPUTER ARCHITECTURE

UNIT-I

Cache Memory: Computer Memory System, Cache Memory Principles, Elements of Cache Design, Pentium-4 Cache Organization, ARM Cache Organization.

Internal Memory: Semiconductor Main Memory, Error Correction, Advanced DRAM Organization.

UNIT-II

External Memory: Magnetic Disk, RAID, Solid State Drivers, Optical Memory, Magnetic Tape.

Input/ Output: External Devices, I/O Modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access, I/O Channels and Processors, The External Interface (Thunderbolt & InfinBand), IBM zEnterprise 196 I/O Structure.

UNIT-III

Instruction Sets Characteristics & Functions: Machine Instruction Characteristics, Types of Operands, Intel x86 & ARM Data Types, Types of Operations, Inter x86 & ARM Operation Types.

Instruction Sets Addressing Modes & Formats: Addressing Modes, x86 & ARM Addressing Modes, Instruction Formats, x86 & ARM Instruction Formats, Assembly Language.

UNIT-IV

Processor Structure & Functions: Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The x*^ Processor Family, The ARM Processor.

Instruction-Level Parallelism & Superscalar Processors: Design Issues, Pentium-4, ARM Cortex-A8.

UNIT-V

Parallel Processing: Multiple Processor Organization, Symmetric Multiprocessors, Cache Coherence & MESI Protocol, Multi-threading & Chip Multiprocessors, Clusters, Non-uniform Memory Access, Vector Computation.

Multicore Computers: Hardware Performance Issues, Software Performance Issues, Multicore Organization, Intel x86 Multicore Organization, ARM11 MPCore, IBM zEnterprise 196 Mainframe.

Text Book:

William Stallings: Computer Organization and Architecture. 9/e

DATA COMMUNICATIONS

UNIT-I

Introduction: Data Communications, Networks, The Internet, Protocols and Standards. Network Models: Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/ IP Protocol Suite, Addressing.

UNIT-II

Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance. Digital Transmission: Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. Analog Transmission: Digital-To-Analog Conversion, Analog-To-Analog Conversion.

UNIT-III

Multiplexing and Spreading: Multiplexing, Spread Spectrum. Transmission Media: Guided Media, Unguided Media (Wireless). Switching: Circuit Switched, Datagrams, Virtual Circuit Networks, Structure of a Switch. Telephone Network, Dial-Up MODEMS, Digital Subscriber Line (DSL), Cable TV Networks, Cable TV for Data Transfer.

UNIT-IV

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol. Multiple Access: Random Access, Controlled Access, Channelization. Wired LANs: IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet: Wireless LANs: IEEE 802.11, Bluetooth.

UNIT-V

Connecting LANs: Connecting Devices, Backbone Networks, Virtual LANs. Wireless LANs: Cellular Telephony, Satellite Networks. SONET: Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Networks, Virtual Tributaries. Virtual-Circuit Networks. Frame Relay, ATM, ATM LANs,

Recommended Books:

1. B. A. Forouzan, “Data Communications and Networking”, 4/e, THM ,2007
2. A. S. Tanenbaum, & David J. Wetherall, “Computer Networks”**,** 5/e, Pearson

COMPUTER GRAPHICS

UNIT-I

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, Introduction to OpenGL. Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.

UNIT-II

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations, Other Transformations (Reflection, shear), Transformation between coordinate systems, Affine Transformations. Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective), Clipping Algorithms.

UNIT-III

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Gamma correction.

UNIT-IV

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method, A-Buffer Method, Scan line and Depth Sorting, Area subdivision Method, Ray Casting Method.

UNIT-V

Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).

Recommended Books:

1. Donald Hearn & M. Pauline Baker, "*Computer Graphics with OpenGL*", Pearson Education.
2. A.V. Dan, F.H. Jones, J.D. Foley, S.K. Feiner, "Computer Graphics Principles & Practices in C", 2/e, Pearson.
3. D. F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill
4. D. F. Rogers, & J. A. Adams, "Mathematical Elements for Computer Graphics", 2/e, McGraw Hill

INTERNET TECHNOLOGY

UNIT-I

Java: Use of Objects, Array and ArrayList class

UNIT-II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT-IV

JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3/e, 2009

3. Herbert Schildt , Java 7, The Complete Reference, , 8/e, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002

SOFTWRE ENGINEERING

UNIT-I

Professional Software Development, Software Engineering Ethics, Software Processes, Software Process Models, Process Activities, Coping with Change, The Rational Unified Process, Agile Software Development, Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, Scaling Agile Methods.

UNIT-II

Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Requirements Engineering Processes, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management, System Modelling, Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

UNIT-III

Design and Implementation: Object-Oriented Design using the UML, Design Patterns, Implementation Issues, Open Source Development, Software Testing: Development Testing, Test-Driven Development, Release Testing, User Testing, Software Evolution: Evolution Processes, Program Evolution Dynamics, Software Maintenance, Legacy System Management, Dependability and Security.

UNIT-IV

Socio-technical Systems: Complex Systems, Systems Engineering, System Procurement, System Development, System Operation. Dependability and Security: Dependability Properties, Availability and Reliability, Safety, Security. Dependability and Security Specification: Risk-Driven Requirements, Specification, Safety Specification, Reliability Specification, Security, Specification, Formal Specification.

UNIT-V

Dependability Engineering: Redundancy and Diversity, Dependable Processes, Dependable Systems Architectures, Dependable Programming. Security Engineering:

Security Risk Management, Design for Security, System Survivability. Dependability and Security Assurance: Static Analysis, Reliability Testing, Security Testing, Process Assurance, Safety and Dependability Cases.

Recommended Books:

1. I. Sommerville, “Software Engineering”, 9/e, Addison Wesley.
2. R. Mall, “Fundamentals of Software Engineering”, 3/e, PHI
3. R.S. Pressman, “Software Engineering”, A Practitioner‘s Approach, 7/e, McGraw-Hill, 2009
4. K.K. Aggarwal and Y. Singh, “Software Engineering”,2/e, New Age International Publishers, 2008

MICROPROCESSOR

UNIT-I

An Introduction to Processor Design: Processor architecture and organization , Abstraction in hardware design, MU0 - a simple processor, Instruction set design ,Processor design trade-offs ,The Reduced Instruction Set Computer, Design for low power consumption .The ARM Architecture: The Acorn RISC Machine ,Architectural inheritance, The ARM programmer's model, ARM development tools.

UNIT-II

ARM Assembly Language Programming: Data processing instructions, Data transfer instructions, Control flow instructions, Writing simple assembly language programs. ARM Organization and Implementation: Pipeline, Types, 3-stage pipeline ARM organization , 5-stage pipeline ARM organization, ARM instruction execution, ARM implementation, The ARM coprocessor interface.

UNIT-III

The ARM Instruction Set: Introduction, Exceptions, Conditional execution , Branch and Branch with Link (B, BL),Branch, Branch with Link and exchange (BX, BLX) , Software Interrupt (SWI) ,Data processing instructions, Multiply instructions, Single word and unsigned byte data transfer instructions , Half-word and signed byte data transfer instructions, Multiple register transfer instructions , Status register to general register transfer instructions ,General register to status register transfer instructions , Coprocessor instructions. Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture v5T only), Unused instruction space, Memory faults, ARM architecture variants.

UNIT-IV

Architectural Support for High-Level Languages: Abstraction in software design, Data types, Floating-point data types, The ARM floating-point architecture, Expressions, Conditional statements, Loops , Functions and procedures , Use of memory, Run-time environment , Examples and exercises.

UNIT-V

Thumb Instruction Set: The Thumb bit in the CPSR, The Thumb programmer's model ,Thumb branch instructions, Thumb software interrupt instruction , Thumb data processing instructions , Thumb single register data transfer instructions, Thumb multiple register data transfer instructions, Thumb breakpoint instruction, Thumb implementation ,Thumb applications . Architectural Support for System Development: The ARM memory interface, The Advanced Microcontroller Bus Architecture (AMBA),The ARM reference peripheral specification, Hardware system prototyping tools, The ARMulator.

Recommended Books:

1. Steve Furber :"ARM System-On-Chip Architecture".

ACCOUNTING AND FINANCIAL MANAGEMENT

UNIT-I

Accounting: The Language of Business, Accounting: An Information system, users of Accounting Information, Branches of Accounting, Generally Accepted Accounting principles, The Accounting Equation, Classification of Accounts, The Double Entry System, Journal & Ledger; Process of Recording, Trial Balance & Errors.

UNIT-II

Cash & Bank; Bank Reconciliation, Fixed Assets, Liabilities & shareholders Equity, Expenses & Revenues, Depreciation, Preparation of Final Accounts : Profit and Loss Account, Balance Sheet.

UNIT-III

Analysis and Interpretation of Financial Statements: Ratio Analysis and Trend Analysis, Cost and cost Terminology, Classification of costs, Statement of costs.

UNIT-IV

Marginal Costing & Absorption Costing: Break-even Analysis, Cost-Volume-Profit Analysis, Job costing and Process Costing.

UNIT-V

Budgetary Control System: Flexible Budgets, Master Budgets: Zero-base Budgeting Responsibility Accounting: Responsibility Centers, Management Control Systems

References:

1. T. S. Grewal : Introduction to Accounting (S.Chand)
2. Jain & Narang : Introduction to Cost Accounting(Kalyani's)
3. S. N. Maheshwari : Management Accounting
4. R. Narayanswamy : Financial Accounting : A Managerial Perspective
5. Jawaharlal : Cost Accounting (Tata Mc Graw Hill)
6. Nigam & Jain:Cost Accounting (PHI)
7. P.C. Tulsian : Financial Accounting (Pearson)

HTML Programming

Unit-I: Introduction

The Basics: The Head, the Body, Colors, Attributes, Lists, ordered and unordered

Unit-II: Links: Introduction, Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link within a Document.

Unit-III: Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

Unit V: –Tables

Creating a Table , Table Headers, Captions, Spanning Multiple Columns, Styling Table

Unit V: –Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here

Book:

Introduction to **HTML** and CSS --O'Reilly

PHP PROGRAMMING

UNIT-I Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other, technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP , Expressions, scopes of a variable (local, global), PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator. PHP operator Precedence and associativity

UNIT-II: Handling HTML form with PHP: Capturing Form Data, GET and POST form methods
Dealing with multi value fields, Redirecting a form after submission. **PHP conditional events and Loops:** PHP IF Else conditional statements (Nested IF and Else), Switch case, while ,For and Do While Loop, Goto , Break ,Continue and exit

UNIT-III PHP Functions: Function, Need of Function , declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local

UNIT-IV String Manipulation and Regular Expression: Creating and accessing String , Searching & Replacing String, Formatting, joining and splitting String , String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression.

UNIT-V Array: Anatomy of an Array ,Creating index based and Associative array ,Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

MULTIMEDIA AND APPLICATIONS

UNIT-I
Multimedia: Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality. **Text**: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

UNIT-II
Images: Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats. **Sound**: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

UNIT-III

Video: How video works, analog video, digital video, video file formats, video shooting and editing. Animation: Principle of animations, animation techniques, animation file formats.

UNIT-IV

Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

UNIT-V

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.

BOOKS

1. Tay Vaughan, ―Multimedia: Making it work‖, TMH, Eighth edition.
2. Ralf Steinmetz and KlaraNaharstedt, ―Multimedia: Computing, Communications Applications‖, Pearson.
3. Keyes, ―Multimedia Handbook‖, TMH.
4. K. Andleigh and K. Thakkar, ―Multimedia System Design‖, PHI.

PROGRAMMING in VISUAL BASIC

UNIT-I

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs. **Controls** : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

UNIT-II

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data. **Decision Making**: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

UNIT-III

Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure. **Forms Handling** : Multiple forms creating, adding, removing forms

in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

UNIT-IV

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function **Arrays and Grouped Data Control**: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window / additem method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

UNIT-V

Database Connectivity: Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database. using forms. Updating/ editing of data based on a criterion.

Books:

Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))

E-COMMERCE

UNIT-I

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, 9 Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).

UNIT-2

The Internet and WWW: Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

UNIT-III

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature(How it Works).

UNIT-IV

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model,Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

UNIT-V

Planning for Electronic Commerce: Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.

Books

1. E-Commerce Concepts, Models, Strategies:- G.S.V.Murthy Himalaya Publishing House
2. E- Commerce:- Kamlesh K Bajaj and Debjani Nag
3. Electronic commerce:- Gray P. Schneider
4. E-Commerce, Fundamentals & Applications: Chand (Wiley) Web and E-Commerce