

BCA – 2nd Year

SINGHANIA UNIVERSITY
Bachelor of Computer Science (BCA)
SYLLABUS & SCHEME

Subject Code	Subject Name	Year	Scheme			IA	ESE	Total Marks
			L	T	P			
BCA~201	OOP with C++	Year 2	4			30	70	100
BCA~202	Data Structures & Algorithm	Year 2	3	1		30	70	100
BCA~203	Digital Electronics	Year 2	3	1		30	70	100
BCA~204	Elementary Mathematics	Year 2	4			30	70	100
BCA~205	Programming with Java	Year 2	4			30	70	100
BCA~206	Data Communication & Network	Year 2	4			30	70	100
BCA~207	System Analysis and Design	Year 2	4			30	70	100
BCA~208	VB.NET	Year 2	3	1		30	70	100
BCA~209	Minor Project	Year 2			4	0	100	100
BCA~210	LAB-1 (Based on 201,202)	Year 2			4	0	100	100
BCA~211	LAB-2 (Based on 205,208)	Year 2			4	0	100	100
	TOTAL :		29	3	12	240	860	1100

BCA-201: OOP with C++

UNIT – 1

Introduction to C++ :

Overview of C++, Benefits of C++ Over C, OOPS Features, Basic of C++, Data Types in C++, Modifiers, Operators in C++, Scope Resolution operator, Member dereferencing operator, manipulators, Looping, Storage Classes.

UNIT – 2

Introduction to Classes and Objects :

Classes in C++, Defining Class and Declaring Objects, Accessing Data Member of Class, Types of Member Functions, Default Arguments, Constructors.

UNIT – 3

Constructor Overloading :

Constructor Overloading, Destructors, Const Keyword, Variables, Pointers, Pointers to object, this pointer Function Argument and Return Types, Class Data Members, Class Member Function, Objects.

UNIT – 4

Overview of Inheritance and Polymorphism :

Introduction of Inheritance, Types of Inheritance, Polymorphism, Virtual Function, Abstract Class.

UNIT – 5

Operator Overloading :

Operator Overloading Instruction, Implementing Operator Overloading, Examples Of Overloading, Dynamic Memory Allocation, Exception Handling in C++, Standard Exceptions In C++.

TEXT & REFERENCE BOOKS:

- HERBERT SCHILDT, "C++ THE COMPLETE REFERENCE " - TMH PUBLICATION ISBN 0-07-463880-7
- E. BALGURUSWAMY, "C++ ", TMH PUBLICATION ISBN 0-07-462038-X
- M KUMAR "PROGRAMMING IN C++", TMH PUBLICATIONS

BCA-202: Data Structure & Algorithm

UNIT-1

Introduction to Data Structure, What is an algorithm, Time complexity of Algorithm.

UNIT-2

Introduction to Sorting, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Searching Algorithms on Array, Binary Search.

UNIT-3

Stacks, Basic feature of stacks, Applications of Stack, Implementation of stack, Algorithm for PUSH operation, POP operation, Top operation, Search operation, Que Data Structure, DEQUEUE operation, Queue Data structure using stacks.

UNIT-4

Introduction to Linked Lists, Advantages and Disadvantages of Linked List, Types of Linked Lists, Linear Linked List, Circular Linked List, Implementing Circular Linked List.

UNIT-5

Graph & Tree algorithms, Graphs, Trees, DAG vs Tree, Binary Tree, Data Structure representation, Searching Algorithm, Breath First Search (BSF) and its implementation, Depth First Search (DFS) and its implementation.

TEXT & REFERENCE BOOKS:

- *FUNDAMENTALS OF DATA STRUCTURE, BY S. SAWHNEY & E. HOROWITZ*
- *DATA STRUCTURE: BY T REMBLEY & SORRENSEN*
- *DATA STRUCTURE: BY LIPSCHUISTS (SCHAUM 'S OUTLINE SERIES MCGRAW HILL PUBLICATION)*
- *FUNDAMENTALS OF COMPUTER ALGORITHM: BY ELLIS HOROWITZ AND SARTAJ SAWHNEY*

BCA-203: Digital Electronics

UNIT-I

Data representation Data Types and Number Systems, Binary Number System, Octal & Hexa-Decimal Number System, Fixed Point Representation, 1's & 2's Complement, Binary, Arithmetic Operation on Binary Numbers, Overflow & Underflow, Floating Point Representation, Codes, ASCII, EBCDIC Codes, Gray Code, Excess-3 & BCD, Error Detection & Correcting Codes Binary Storage and Registers.

UNIT-II

Boolean algebra and digital logic circuits -Logic Gates, AND, OR, NOT,, NOR, NAND & XOR Gates and their Truth Tables, Boolean Algebra, Basic Definition and Properties, Basic Boolean Law's, Demorgan's Theorem, Minimization Techniques, K Map – Two, Three and More Variables maps, Sum of Product & Product of Sums, Don't care conditions.

UNIT-III

Combination Circuits - Half adder & Full adder, Full Subtractor, Full Subtractor and decimal adder, Code Conversion, Multilevel NAND and NOR Circuits, Decimal adder, decoders, Multiplexers and Demultiplexers.

UNIT-IV

Sequential logic- Flip-Flops - RS, D, JK & T Flip-Flop, Triggering in flip flops, Analysis of Clocked Sequential Circuits, State education and Assignment, flip flop excitation tables, Design procedure and design of counters. Design with equations.

UNIT-V

Registers, Counters and the memory unit, Shift registers, Ripple counters and Synchronous counters, Inter-register Transfer, Arithmetic Logic and Shift Micro Operation, Conditional Control Statement, Instruction Codes, Processor organization, design of a simple computer.

TEXT & REFERENCE BOOKS:

- *DIGITAL LOGIC AND COMPUTER DESIGN BY MORRIS MANO*
- *COMPUTER SYSTEM ARCHITECTURE BY MORRIS MANO*

BCA-204: Elementary Mathematics

UNIT-I

Sets and Their Representations. Empty Set, Finite & Infinite Sets, Equal Sets. Subsets. Subsets of the Set of Real Numbers specially Intervals (with notations). Power Set. Universal Set. Venn Diagrams. Union and Intersection of Sets. Difference of Sets. Complement of a Set. Ordered Pairs, Cartesian Product of Sets. Number of Elements in the Cartesian Product of two Finite Sets. Cartesian Product of the Reals with itself (upto $R \times R \times R$). Definition of Relation, Pictorial Diagrams, Domain. Co- domain and Range of a Relation.

UNIT-II

Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain & range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions. Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.

UNIT-III

Complex numbers, Brief description of algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Fundamental principle of counting. Factorial n . ($n!$), Permutations and combinations,.

UNIT-IV

Sequence and Series. Arithmetic progression (A. P.). arithmetic mean (A.M.) Geometric progression (G.P.), general term of a G.P sum of n terms of a G.P., geometric mean (G.M.), relation between A.M. and G.M. Sum to n terms of the special series $\sum n$, $\sum n^2$ and $\sum n^3$.

UNIT-V

Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two point form, intercepts form and normal form. General equation of a line. Distance of a point from a line.

Standard equation of a circle, Coordinate axes and coordinate planes in three dimensions. Coordinates of a point.

TEXT & REFERENCE BOOKS:

- www.e-booksdirectory.com/mathematics
- www.origoeducation.com/go-maths.
- *BASICS OF MATHEMATICS BY R D SHARMA.*

BCA-205: Programming with Java

UNIT-I

History and design features of JAVA, how java works, basics of JAVA, Applications and Applets, using the tools in JDK, javadoc, java, jdb etc. Applet Programming - Creating and executing Java applets, inserting applets in a web page, Java security. JAVA Language- Keywords, Constants, Variables, and Data Types. Operators and Expressions, Decision making, Branching and Looping, Labeled Loops Statement, Jump statements: Break, Continue, and Return. Arrays and Strings- Creating an Arrays, one and two Dimension Arrays, String Array, String and String Buffer Classes.

UNIT-II

Classes, Objects and Methods Defining a class, adding variables and Methods, creating objects constructors, Wrapper Classes. Inheritance, Basics types, using super, multi level hierarchy, abstract and final classes, object class, packages and interfaces, Access protection, Extending interfaces, packages.

UNIT-III

Exception Handling, Fundamentals exception types, uncaught exceptions, throws, throw, try -catch, final, built in exceptions, creating your own exceptions.

Multithreading Fundamentals, Java Thread model : priorities, synchronization, messaging, thread class, Runnable interface, Interthread communication, suspending, resuming and stopping threads.

UNIT-IV

Input/Output -Basics, Streams, Byte and Character streams, predefined streams, reading and writing from console and files .Using standard Java Packages (lang,util,io)

Networking -Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Datagram programming.

UNIT-V

AWT Classes, Event Handling and Swing classes, AWT Programming, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Handling image, animation, sound and video.

Event Handling-Different mechanism, the Delegation Event Model, Event Classes, Event Listener interfaces, Adapter and Inner Classes. Java Swing -Japplet, Icons and Labels, Text fields, Buttons, Combo Boxes, Tabbed and Scroll Panes, Trees, Tables.

TEXT & REFERENCE BOOKS :

- *JAVA THE COMPLETE REFERENCE BY PATRICK NAUGHTON AND HERBERT SCHILDT. TMH PUBLICATION ISBN 0-07-463769-X*
- *PROGRAMMING WITH JAVA BY E. BALAGURUSWAMY TMH PUBLICATIONS ISBN 0-07-463542-5*
- *USING JAVA 1.2 BY JOSEPH WEBER. PHI – ISBN-81-203-1558-8*

BCA-206: Data Communication & Network

UNIT -I

Networking - Needs and Advantages, Network, Types- Client, Server and Peers, Introduction to various types of servers. Wired & Wireless transmission, Base band and Broadband transmission, Layered Technology, Overview of OSI Model.

UNIT-II

Transmission Media Types- Properties & Specialty of Various Media Types, Comparative Study. Network Topology-Bus, Star, Ring, Star Bus, Star Ring, Mesh Features, Advantages and Disadvantages of Each Type, Network Adapters Cards.

UNIT –III

The Theoretical Network Model – OSI, Introduction to IEEE 802 standards, Ethernet, Token Rings, FDDI, Network Scaling- No, of nodes, distance, software, speed, special requirements ,Connectivity Devices: Modem, Repeater, Hub, bridge Gateway.

UNIT –IV

Overview of TCP/IP reference model. Protocols- IP, TCP, UDP, ARP, SNMP, FTP, SMTP, TELNET Protocols, IP Addressing Class A, B & C. Domain Name Addressing, URL, E-mail address.

UNIT-V

Network Security : Network Security Issues, Security Barriers Needs Firewalls and Features of Firewalls, Types of Firewall Technology, Network Level and Application Level, IP Packets Filter Screening Routers, Limitations of Firewalls.

TEXT & REFERENCE BOOKS:

- *NETWORKING ESSENTIALS:STUDY GUIDE MCSE AMES CHEWS CHARLES PERKINS, MATTHEW STREBE BPB PUBLICATIONS.*
- *LOCALAREA NETWORKS'S.K.BASANDRA & S. JAISWAL , GALGOTIA PUBLICATIONS*
- *COMPUTER NETWORK ANDREW & T ANENBAUM,*
- *DATA AND COMPUTER COMMUNICATION WILLIAM STERLING*
- *DATA COMMUNICATION BY PRAKASH C GUPTA*

BCA-207: System Analysis & Design

UNIT-1

1. SYSTEMS ANALYSIS AND DESIGN – OVERVIEW

Systems Analysis, Systems Design, What is a System?, Elements of a System, Types of Systems, Systems Models, Categories of Information.

2. SYSTEM DEVELOPMENT LIFE CYCLE

Phases of SDLC, Life Cycle of System Analysis and Design, Role of System Analyst, Attributes of a Systems Analyst

UNIT-2

3. SYSTEM PLANNING

What is Requirements Determination?, Major Activities in requirement Determination, Information Gathering Techniques, Feasibility Study, Steps Involved in Feasibility Analysis, Types of Feasibilities

4. STRUCTURED ANALYSIS

What is Structured Analysis?, Structured Analysis Tools, Data Flow Diagrams (DFD) or Bubble Chart, Data Dictionary, Decision Trees, Decision Tables, Structured English, Pseudocode, Guidelines for Selecting Appropriate Tools.

UNIT-3

5. SYSTEM DESIGN

Inputs to System Design, Outputs for System Design, Types of System Design, File Organization, File Access, Documentation Control, Types of Documentations, User Documentation, System Documentation

6. DESIGN STRATEGIES

Top-Down Strategy, Bottom-Up Strategy, Structured Design, Factors Affecting System Complexity

UNIT-4

7. INPUT / OUTPUT & FORMS DESIGN

Input Design, Output Design, Forms Design

8. TESTING AND QUALITY ASSURANCE

Testing, Types of Testing, Rules for System Testing, Quality Assurance

UNIT-5

9. SYSTEM IMPLEMENTATION AND MAINTENANCE

Training, Training Methods, Conversion, System Maintenance / Enhancement

10. SYSTEM SECURITY AND AUDIT

System Audit, Audit of Computer System Usage, Audit Trial, Audit Methods, Audit Considerations, Security, Control Measures, Risk Analysis

TEXT & REFERENCE BOOKS:

- *SYSTEM ANALYSIS & DESIGN BY V K JAM, DREAMTECH PRESS*
- *MODERN SYSTEM ANALYSIS & DESIGN BY A HOFFER, F GEORGE, S VALACIAH LOW PRICED EDN. PEARSON EDUCATION.*
- *INFORMATION TECHNOLOGY & COMPUTER APPLICATIONS BY VK.KAPOOR SULTAN CHAND & SONS, NEW DELHI.*

BCA-208: VB.NET

UNIT-I

Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies: types of assemblies, class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Project Explorer, Toolbox, Properties Window, form designer, form layout, immediate window. Event driven Programming - Methods and events related with mouse and keyboard.

UNIT-II

The VB.NET Language- Console Programming, Declaring variables, Data Types, Scope & lifetime of a variable, Arrays, types of array, control array
Subroutine, Functions, Passing argument to functions, Optional Argument, Returning value from function.
Control flow statements: Decisions and Conditional statement, Loop statement. Exceptions
Working with Forms: Creating Forms, Building User Interface Web Forms, Loading, showing and hiding forms, working with multiple forms, controlling One form within another.

UNIT – III

GUI Programing with windows form: VB.Net Controls, Text box control, label control, button control, Listbox, Combo box, checked box, Picture box, Radio button, Pannel, scroll bar, Timer control , there Properties, Methods and events, adding controls at runtime.
Dialog Boxes - Common dialog control: File, save, Print, Help.
Designing menus : Creating Menu and Menu Items, access & shorcut keys.
MDI forms : Properties of Parent & child form, working with parent and child menus.

UNIT-IV

Object oriented Programming: Classes & Namespaces, objects, data members, Properties, Methods, raising and handling Events, constructors. Inheritance, Access Specifies: Public Private, Protected, overloading, overriding, Creating Interfaces, multiple interfaces, My Base & My Class keywords.
Concept of OLE, The COM technology, Advantages of COM+, COM & .NET, Create User control, register user control, access com component in .net application.
Deployment of .NET application.

UNIT-V

Accessing Database with ADO.NET (visually): Create connection with sever explorer, Creating data connection using data Connection, Command, Adapter, Dataset and DataReader controls.
Data binding with data grid and basic controls. The Data Form wizard.
Accessing Database using ADO.NET Object model (through code): create Connection object, Command object, DataAdapter object, DataSet object. Add, delete, move & update records to dataset. Executing SQL query, operation on data rows and columns.

TEXT & REFERENCE BOOKS:

- *VB.NET PROGRAMMING BLACK BOOK BY STEVEN HOLZNER –DREAMTECH PUBLICATIONS*
- *MASTERING VB.NET BY EVANGELOS PETROUTSOS- BPB PUBLICATIONS*
- *INTRODUCTION TO .NET FRAMEWORK-WORX PUBLICATION*
- *MSDN.MICROSOFT.COM/NET/*
- *WWW.GOTDOTNET.COM*

BCA-209 : Minor Project

Prepare Minor Project in VB.NET or any Web Site (Report : 50 Pages)