THE CURRICULUM

The course structure that guides the teaching, practical and associated assessment of BCA programme is described year-wise in the following tables.

SECOND YEAR

CODE	SUBJECT	MARKS		
		Internal	Main	Total
BC-201	Database Management System	25	75	100
BC-202	Data Structures through C++	25	75	100
BC-203	Java Programming	25	75	100
BC-204	Operating System	25	75	100
BC-205	System Analysis and Design	25	75	100
BC-206	Computer Oriented Statistical and Numerical Techniques	25	75	100
BC-207	LAB based on 201	25	75	100
BC-208	LAB based on 202	25	75	100
BC-209	LAB based on 203	25	75	100
BC-210	LAB based on 204	25	75	100

Java programming is taken up after C++ is over.

BC 201: DATA BASE MANAGEMENT SYSTEM

UNIT I

Introduction to Database Management System (DBMS): What is a database system, Why database, characteristics of data in database, DBMS, Advantages of DBMS, Overview of Database Models**:** Hierarchical**,** Network**,** Relational, Object oriented, Object relational. Three levels of Database Architecture: Conceptual, physical and logical levels. **Entity Relationship Model:** Components of ER Model, Super class and sub class entity types, Attribute inheritance, Specialization, Generalization, Categorization.

UNIT II

Relational DBMS: RDBMS Terminology, relational data structure, data integrity, Codd's rule. Overview of relational algebra and relational calculus. **Relational Database Design:** Keys, Relationship, First Normal Form, Functional dependencies, 2NF, 3NF, Boyce-Code Normal Form, Database Life Cycle.

UNIT III

Introduction to SQL: SQL data types and literals, types of SQL commands, SQL operators, tables, views, indexes, queries and subqueries, aggregate functions, insert, update and delete operations, cursors, joins, unions, intersection, triggers, Query processing, cost-based and rule based optimization.

UNIT IV

Transactions: transaction concept, transaction properties, transaction states. **Concurrency:** locking, deadlock, serializability.

UNIT V

Database Security: Data Security Risks, Data security requirements. Database backup and recovery, recovery techniques. Database users. Overview of physical storage media, File organization, Organization of records in a file, Indexing and hashing.

Main Text Books :

1. A, Leon and M.Leon, "Database Management Systems", First Edition, 2002. Vikas Publishing House (P) Ltd.

2. R, Elrnasri, S. Navathe, " Fundamentals of Database System", Third Edition, 2000. Addison Wesley .

Reference Books :

I. H. Korth, A. Siilberschatz, "Database System Concepts-", McGraw–Hill Internation.

2. B. Desai, "An introduction to Database System", Galgotia Publication. 3. D. K. Kroenke, "Database Processing: Fundamentals, Design implementation", Prentice Hall of India.

4. P. Battachar and A.K. Majumdar : "Database Management System P. Bhattacharya".

BC 202: DATA STRUCTURES THROUGH C++

UNIT I

Basic concepts of Object Oriented Programming, Benefits of OOP, Applications of OOP. Data types: Basic data types, User Defined data types, Derived data types, symbolic constant, reference variable, Operators in C++, Manipulators, Type cast operators. **Control Structures:** simple if, if-else, else-if ladder, switch statements. Loops : for, while and do-while statements, Break, continue, goto statements. **Functions:** functions prototyping, call by reference, inline functions, default arguments, function overloading.

UNIT II

Classes and Objects: structure, specify a class, defining member functions, array of objects, friend function, constructors and destructors, copy constructor. **Operator Overloading:** Overloading unary operators, Overloading binary operators, overloading binary operators using friends. Type conversion.

UNIT III

Inheritance: defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance, virtual base classes, **Pointers:** Pointers to objects, this pointer, virtual functions. **Working with Files:** opening and closing a file, sequential input and output operations, command line arguments.

UNIT IV

Introduction (basic terminology**) -** data structure operations, time space trade off, **Array:** representation of linear arrays in memory, traversing of linear arrays, insertion and deletion, bubble sorting, linear search, binary search. **Link List:** Singly linked lists: representation of linked lists in memory, traversing, searching, insertion, deletion from linked list, concept of doubly linked list and circular linked list.

UNIT V

Stack: array based implementation, linked list implementation, operations associated with stacks create - push & pop, applications. **Queue:** array based implementation, linked list implementation, operations of queues: create, insert, delete. Concept of circular queues, priority queues and dequeues. **Searching and sorting:** selection sort, insertion sort, quick sort, merge sort, radix sort, hashing.

Main Text Books :

1. Robert Lafore : Object Oriented Programming in C++
2. Balagurusami : OOP with C++
3. Y Kanetkar : Let us C++
4. Y Kanetkar, “Data Structures through C++”
5. R. B. Patel, “Expert Data Structures”, Khanna Books.

Reference Books :

1. Y. Langsam, M.J. Augenstein and A. M. Tanenbaum, “Data structures using C and C++”, Prentice Hall of India
2. R. Kruse, C. L. Tondo and B. Leung, “Data Structure and Program Design in C”
3. E. Horowitz, Sahni and D. Mehta, “Fundamentals of Data Structures in C++”
4. Stroustrap, B : The C++ programming Language- Addison Wesley, 1988.

BC 203: JAVA PROGRAMMING

UNIT I

Fundamentals of Object Oriented Programming: object oriented paradigm, basic concepts of object oriented programming, benefits and applications of OOP, Java features, comparison of Java with C and C++, Java and internet, Java and WWW, Java environment. **Overview of Java Language:** simple Java program, Java program structure, java tokens, Java statements, JVM, command line arguments, constants, variable, data types, scope of variables, symbolic constant, type casting, getting values of variables; Operators and expressions, operator precedence and associativity. **Decision Making – Branching and Looping:** simple if statement, if . . . else statement, nesting of if . . . else statement, else if ladder, switch statement, ? : operator; while, do, for statements, jumps in loops, labeled loops.

UNIT II

Classes, Objects and Methods: defining a class, fields and method declaration, creating objects, accessing class members, constructors, methods overloading, static members, nesting of methods, inheritance, overriding methods, final variables and methods, final classes, finalizer methods, abstract methods and classes, visibility control. **Arrays, Strings and Vectors:** one-dimensional arrays, creating an array, two-dimensional arrays, strings, vectors, wrapper classes, enumerated types, annotations. **Interfaces:** defining, extending and implementing interfaces, accessing interface variables.

UNIT III

Packages: Java API packages, using system packages, naming conventions, creating packages, accessing a package, using a package, adding a class to a package, hiding classes, static import. **Multithreaded Programming:** creating threads, extending the thread class, stopping and blocking a thread, lifecycle of a thread, using thread methods, thread exceptions, thread priority, synchronization, implementing a 'runnable' interface.

UNIT IV

Managing Errors and Exceptions: types of errors, exceptions, syntax of exception handling code, multiple catch statements, using finally statement, throwing our own exceptions, using exceptions for debugging. **Applet Programming**: comparing applets and applications, building applet code, applet lifecycle, designing a web page, applet tag, adding applet to html file, passing parameters to applets, displaying numerical values, getting input from user.

UNIT V

Graphics Programming: the graphics class, lines and rectangles, circles and ellipses, drawing arcs, polygons and graphs, using control loops in applets, drawing bar charts. **Managing Input / Output Files in JAVA:** concept of streams, stream classes, byte stream classes, character stream classes, using streams, using the file class, reading / writing characters and bytes, handling primitive data types, concatenating and buffering files, random access files, interactive input and output.

Main Text Books:

1. E Balagurusamy, 'Programming with Java', Tata McGraw Hill

2. Herbert Schildt, "The Complete Reference – Java2", Tata McGraw Hill

3. Dietel and Dietel:"JAVA - how to program", Prentice Hall

BC 204: OPERATING SYSTEM

UNIT I

Introduction: Operating System Operations, Operating System Services, System Calls, System Programs, Operating System Design and Implementation, Operating Systems Structure, Virtual Machines, System Boot.

UNIT II

Process Management: Overview of Process Concept, Operation on Processes, Interprocess Communication, Overview of Multithreaded Programming, Multithreading Models, threading Issues, Basic concepts of Process Scheduling, Scheduling Criteria, Scheduling Algorithms. **Deadlocks:** Deadlocks Characterization, Methods for Handing Deadlocks, Deadlock prevention, Deadlocks Avoidance, Deadlocks Detection, Recovery from Deadlock.

UNIT III

Memory Management: Basic concept of Memory Management, Swapping, Contiguous Memory Allocation, Paging, Segmentation. Virtual Memory: Demand Paging, Page Replacement, Thrashing.

UNIT IV

Storage Management: File System: Access Methods, Directory Structure, Protection. File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

UNIT V

Distributed Operating Systems: Types of Distributed Operating System, Communication Structure, Design Issues. **Protection & Security:** Goals of Protection, Principles of Protection, Domain of Protection. **Security:** The Security Problem, Program Threats, System and network Threats, Cryptography as a Security tool, User authentication. **Case Studies**: The Linux System, Window XP.

Main Text Books :

1. Silberschatz Galvin, “Operating System Concepts”, Addison- Wesley Longman.
2. Andrew S. Tanenbaum, Albert S. Woodhull, “Operating System: Design & Implementation”, 2002. Pearson Eductation Asia.

BC 205: SYSTEM ANALYSIS AND DESIGN

UNIT I

Introduction: System Definition and Concepts, characteristics of a system, elements of a system, types of systems: Physical or abstract systems, open or closed systems, formal and informal information systems, Computer Based Information System, Management Information System, Decision Support System; Introduction to System Development Life Cycle (SDLC); Role of System Analyst.

UNIT II

System Analysis: Bases for Planning in system analysis, initial investigation, Information Gathering tools: on site observation, interviews and questionnaires; Tools of structured analysis: Data flow diagram (DFD), data dictionary, decision tables, decision trees and structured English.

UNIT III

Feasibility study: system performance definition, feasibility considerations, steps in feasibility analysis, feasibility report, oral presentation; **cost / benefit analysis**: data analysis, cost and benefit categories, procedure for cost / benefit determination, the system proposal.

UNIT IV

System Design: the process of design, design methodologies: structured design, form driven methodology, structured walkthrough; Major Development activities, audit consideration, **Input / Output and Form Design:** input design, output design, forms design.

UNIT V

System Implementation: the test plan, quality assurance, conversion, post implementation review, software maintenance, procedure for hardware / software selection, project management, planning tools, project organization, system security, disaster / recovery planning, ethics in system development.

Main Text Book :

Elias M Awad : System Analysis and Design.

Reference Books :

1. Henry Lucas Jr. : The Analysis, Design and Implementation of Information System.

2. Whiten, Bently & Barlow: System Analysis and Design.

BC 206: COMPUTER ORIENTED STATISTICAL AND NUMERICAL TECHNIQUES

UNIT I

Interpolation: forward, backward, central difference, divided difference formulae, finite difference, Newton formulae for interpolation, stirlings formulae, Bessel's's formulae, Lagrange's interpolation formulae.

UNIT II

Numerical differentiation and integration: numerical methods for solving ordinary differential equations. Numerical integration: Trapeziodal rule, simpson's ⅓ rule, simson's 3/8 rule.

UNIT III

Solution of algebraic and transcendental equations: the bisection method, the method of false position, Newton-Raphson method, numerical solution of ordinary differential equation: Taylor's methods, Runge-Kutta methods, Milner's Predictor Corrector method.

UNIT IV

Measure of central tendency: introduction, arithmetic mean, properties of arithmetic mean, merits and demerits, median and its merits and demerits, mode and its merits and demerits.

UNIT V

Measure of dispersion: introduction, range, coefficient of range, quartiles, quartile deviation, coefficient of quartile duration, mean deviation and coefficient of mean deviation, standard deviation, variance of all types of distribution, coefficient of dispersion, coefficient of variation.

Suggested Readings :

1. I. R. Miller : Probability and statistics for engineers.

2. S. D. Conte : Elementary Numerical Analysis.

3. Computer Oriented Numerical method - V. Rajaraman

Ref. Books :

1. Introductory methods of numerical analysis - S.S. Shastri

BC 207: LAB BASED ON 201

Practical based on theory paper, mini project, handling the small database.

BC 208: LAB BASED ON 202

Practical based on theory paper, mini project, implementation of data structure algorithm.

BC 209: LAB BASED ON 203

Practical based on theory paper, mini project handling the small database.

BC 210: LAB BASED ON 204

Practical based on Linux and Windows operating system.