Syllabus of BCA Second Semester

The course will consists of Five Theory Papers of 80 marks each and one Practical Paper of 100 marks for which there will be University examinations. Other than the internal evaluation for each Theory Paper which will be of 20 marks and will be evaluated on the basis of classroom performance and internal examination.

The students will be required to answer Five Questions out of which one will be objective and compulsory, where the paper consists of more than one group the students, will be required to answer at least one question from each group.

BCA – 201: Object-Oriented Programming with ANSI & Turbo C++

Object-Oriented Paradigm: Key Concept of OOP, Advantages of OOP, Uses of OOP, Object-oriented Vs Conventional Programming, Elements of OOP, Object-Oriented Languages.

Introduction to C++: Evolution of C++, Application of C++, Structure of C++ Program, Creating the Source File, Compiling and Linking

Input and Output In C++ : Streams in C++, Pre-Defined Stream Classes and Objects, Unformatted and Formatted Console I/O Operations, Member Functions of Stream Classes, Bit-Fields and Flags, Manipulators, User-Defined Manipulators, Custom-Build I/O Objects.

C++ Declarations: Tokens, Types of Tokens, Keyword, Identifiers, Operator in C++, Precedence and Associability of Operators, Constants, User-Defined Constants, Data Types in C++, Basic Data Types, Derived Data Types, User-Defined Data Types, The void Data Type, Type Modifiers, Wrapping Around, Type Casting, Variable Declaration and Initialization, Dynamic Initialization.

Control Structures: Control Statements, Decision Making Statements – if, if…else, Nested if…else, switch…case, Nested switch…case Statements. Loop Statements – for ( )…Loop, while ( )…Loop, do…while ( ) Loop. Nesting of Loop Statements, Jump Statements – return, goto, break, continue.

Functions in C++: Functions, Parts of Functions, Passing Arguments, LValues and RValues, Return by Reference, Default Arguments, The const Argument, inline Function, Rules of inline Function, Function Overloading, Principle of Function Overloading, Precautions with Function Overloading, Library Functions

Classes and Objects: Structures in C++, Classes, Access Specifiers – public, private, protected. Components of Class, Class Declaration, Defining Member Functions, Characteristics of Member Functions, Outside Member Function inline , Declaring Objects, static Member Variable and Functions, static Objects, Array of Objects, Objects as Function Arguments, Member Function and Non-Member Function, friend Function, The const Member Function, Empty, static and const Classes, Bit-Fields and Classes.

Constructors and Destructors: Constructors and Destructors – Characteristics and Applications, Constructor with Default Arguments, Overloading Constructor, Calling Constructors and Destructors, The const Object, Local and Global Object, Qualifier and Nested Classes.

Operator Overloading and Type Conversion: Operator Function, Operator Return Type, Operator Overloading, Rules for Operator Overloading, Overloading Unary Operators – Increment and Decrement Operators, Overloading Binary Operators, Overloading with Friend Function, Type Conversion, One Argument Constructor and Operator Function, Overloading Stream Operators – >> and <<.

Inheritance: Inheritance, Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid,

Multipath. Virtual Base Classes, Constructor and Destructor with Inheritance, Object as a Class Member, Abstract Classes, Qualifier Classes and Inheritance, Common Constructor, Advantages and Disadvantages of Inheritance.

Bibliography and References:

1. Ashok N. Kamthane, *Object-Oriented Programming with ANSI & Turbo C++*, Pearson Education.

BCA – 202: Data Structures Using C and C++

Introduction to Data Structures: Introduction and Meaning, Arrays in C, Structures in C.

The Stack: Definition and Examples, Representing Stack in C, Infix, Postfix and Prefix.

Recursion: Recursive Definition and Processes, Recursion in C, Writing Recursive Programs, Simulating Recursion, Efficiency of Recursion.

Queue and Lists: The Queue and its Sequential Representation, Linked Lists, Lists in C, Example: Simulation and Using Linked Lists, Other List Structures, The linked List in C++.

Trees: Binary Trees, Binary Tree Representations, Example: The Huffman Algorithm, Representing Lists as Binary Trees and their Applications, Example: Game Trees.

Sorting: General Background, Exchange Sorts, Selection Sorts, Tree Sorting, Insertion Sorts, Merge and Radix Sorts.

Searching: Basic Search Techniques, Tree Searching, General Search Trees, Hashing.

Graphs and Their Applications: Graphs, A Flow Problem, Linked Representation of Graphs, Graph Traversal and Spanning Forests.

Storage Management: General Lists, Automatic List Management, Dynamic Memory Management.

Bibliography and References:

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures Using C and C++, PHI.

BCA – 203: Numerical Analysis

Errors in Numerical Calculations: Numbers and their Accuracy, Mathematical Preliminaries, Errors and their Computation, A general Error Formula.

Solution of Algebraic and Transcendental Equations: The Bisection Method, The Method False Position, Newton-Raphson Method, The Iteration Method.

Interpolation: Errors in Polynomial Interpolation, Finite Differences, Detection of Errors by use of Difference Tables, Newton's Formula for Interpolation, Interpolation with Unevenly Spaced Points, Inverse Interpolation and Double Interpolation.

Curve Fitting: Least-Square Curve Fitting Procedures, Weighted Least Squares Approximations.

Numerical Differentiation and Integration: Numerical Differentiation, Maximum and Minimum Values of a Tabulated Function. Numerical Integration, Euler-Maclaurin Formula, Adaptive Quadrature Methods, Gaussian Integration.

Matrices and Linear Systems of Equation: Basic Definitions, Solution of Linear Systems – Direct and Iterative Methods, Eigen Value, Eigen Vectors, Singular Value Decomposition.

Bibliography and References:

1. S. S. Sastry, *Introductory Methods of Numerical Analysis*, PHI.

BCA – 204: Digital Electronics

Fundamental Concepts: Concepts of Signals and Systems and their Digitalization.

Number System and Codes: Decimal, Binary, Octal and Hex Codes, Concept of Non Weighed Codes, 2's Complement and 1's Complement Arithmetic, Error Codes and their Correction.

Semiconductor Devices: Semiconductor and Their Types, Concept of Semiconductor Switching Devices.

Digital Logic families: Introduction and Characteristics of RTL, DTL, HTL, TTL, ECL, MOS and CMOS Families, Tri-State Logic.

Combinational Logic Design (MSI) Circuits: Multiplexers, De-Multiplexers, Encoders and Decoders Design and Working Principles, Reduction of Boolean Combinational Functions by Boolean Algebra, K-Maps, Minimizing Logical Functions not Specified in K-Map Simplification, Adders and Subtractors Concept, Use of Combinational Circuits for BCD Arithmetic, Arithmetic Logic Unit, Digital Comparators, Parity Generators, Checkers, Code Converters, Parity Encoders, Decoders and Drivers for Displaying Devices.

Flip – Flops: A 1-bit Memory Cells, Their Types and Excitation Tables, Trigging of Flip-Flops

Sequential Logic Design: Registers, Shift Registers, Ripple, Synchronous and Asynchronous Counters, Clocked Sequential Circuit Design.

A/D and D/A Converters: Digital-to-Analog Converter, Analog-to-Digital Converter.

Timing Circuits : Logic Gates in Timing Circuits, OPAMP as Timing Circuit Elements, Schmitt Trigger, Mono Stable, A Stable and Bitable Multi-Vibrator, Timer 555.

Semiconductor Memories: Semiconductor Memories, Their Organization and Operation, Expanding Memory Size, Characteristics and Classification of Memories, Sequential Memories, ROM, Read and Write Memory, Content Addressable Memory, Charge Couple Device Memory.

Programmable Logic Devices: ROM as PLD, Programmable Logic Array, Programmable Array Logic, Field Programmable Gate Array.

Bibliography and References:

1. R. P. Jain, *Modern Digital Electronics,* Tata McGraw-Hill.

BCA – 205: Discrete Mathematics and Financial Accounting

Group – A: Discrete Mathematics

Set Theory: Introduction, Operations on Sets, Union of Sets, Set Identities, Representation of a Set in a Computer, Symmetric Difference of Sets. Relation between Sets, Closures of Relation, Path in Directed Graphs, Partial Ordering, Lexicographic Order (Dictionary Order), Hash Diagram. N-array Relations and Their Applications, Relations and Database. Functions, Cryptology, Mathematical Induction, Set Relations and Functions, Permutations and Combinations, Combinations.

Mathematical Logic: Introduction, Propositions and Logical Operators, Construction of Truth Tables, Tautologies and Contradictions, Equivalence and Implication, NAND and NOR, Functionally Complete Sets, Two State Devices and Statement Logic, Normal Forms, Predicate Calculus.

Induction, Recursion and Recurrence Relations: Introduction, Mathematical Induction, Recursion, Recursion and Iteration, Closed Form Expression, Recurrence Relations, Generating Functions.

Lattices and Boolean algebra: Introduction, Lattices, Boolean algebra, Karnaugh Map Representation of Logical Functions.

Group – B: Financial Accounting

Accounting: Manual Accounting, Computerized Accounting.

Accounting Information: Groups, Managing Groups, Multiple Groups; Ledger, Working with Ledgers, Multiple Ledgers; Cost Centre, Single Mode, Multiple Mode Centre.

Vouchers in Tally: Configuring Vouchers, Pre-defined Vouchers, Vouchers for the Transaction.

Inventory Information : Stock Groups, Multiple Stock Groups; Stock Categories, Multiple Stock Categories; Stock Item, Multiple Stock Item; Godowns, Multiple Godowns; Voucher Types; Units of Measure.

Pure Inventory Vouchers: Types of Inventory Vouchers, Purchases, Sales.

Order Invoices: Purchase Order, Sales Order, Invoices.

Reports : Trial Balance, Balance Sheet, Profit and Loss Account, Ratio Analysis, Display Menu, Account Books, Statements of Accounts, Inventory Books, Statements of Inventory, Cash/Funds Flow, Bank Reconciliation Statement, Day Book.

Internet Capabilities: E-mail, Web Publishing, Web Browser.

Important Features of Tally: Multiple Currencies & Foreign Exchange, Rates of Exchange, Budget, Scenario Management, Security Control in Tally, Splitting Company Data, Group Companies, Tally Audit, Tally Interface, Tally ODBC, Backup and Restore, Key Combinations.

Bibliography and References:

1. N. Ch. S. Iyengar, V. M. Chandrasekaran, K. A. Venkatesh, P.S. Arunachalam, *Discrete Mathematics*, Vikas Publishing House Pvt. Ltd.
2. Namrata Agrawal, *Financial Accounting using Tally 6.3,* Dreamtech.

BCA – 206: Practical

Practical based on the topics covered in the semester

• • • • • • •