Syllabus of BCA FIRST Semester Course

The course will consists of Six Theory Papers of 80 marks each 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.

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BCA – 101 : Computer Fundamentals and Programming

Number Systems : Representation of characters integers and functions in Computers, various representation of numbers, Error detecting codes,

Input-Output Units : Principles of Computer input / output units, various input and output units. Serial, parallel, USB ports.

Memory : Computer memory, principles, various types of computer memory, primary and secondary memory.

Processor : Computer processor – Summary, description, machine language programs.

Computer Architecture : Interconnection of units, processor to memory, I/o to processor Communications, Interrupt structure, Multiprogramming and multitasking, Processor features, RISC & CISC, Virtual memory.

Computer Languages : Programming concepts, assembly language, high level language, coupling high level languages, some high level languages.

Operating System : Why do we Need an Operating System?, Batch Operating System, Multiprogramming Operating System, Time Sharing Operating System, Personal Computer Operating System, Microkernel Based Operating System, On-Line and real Time System.

Computer Generations and Classifications : First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of Computers, Distributed Computer System, Parallel Computers.

Computer and Communications : Types of Communications with and among Computers, Need for Computer Communication Networks, Internet and the World Wide Web, Characteristics of Communication Channels, Allocation of Channel, Physical Communication Media, Establishing Channels for Communication, Computer Network Topologies, Communication Protocols, Local Area Network, ATM Networks, Interconnecting Networks.

Bibliography and References:

1. V. Rajaraman, *Fundamentals of Computers*, PHI.

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BCA – 102 : Mathematics – I

Algebra, Trigonometry, and Elementary Functions : Problems on Integers, Criteria for Divisibility ; Real Numbers, Transformation of Algebraic Expression; Mathematical Induction, Elements of Combinatorics, Binomial Theorem; Equations and Inequalities of the First and the Second Degree; Equations of Higher Degrees, Rational Inequalities; Irrational Equations and Inequalities; Systems of Equations and Inequalities; The Domain of Definition and the Range of a Function; Exponential and Logarithmic Equations and Inequalities; Transformations of Trigonometric Expressions. Inverse Trigonometric Function; Solution of Trigonometric Equations, Inequalities, and Systems of Equations; Progressions; Solution of Problems on Derivation of Equations; Complex Numbers.

Fundamentals of Mathematical Analysis : Sequences and Their Limits, An Infinitely Decreasing Geometric Progression, Limits of Functions; The Derivative. Investigating the Behaviour of Functions with the Aid of the Derivative; Graphs of Functions; The Antiderivative. The Integral. The Area of Curvilinear Trapezoid.

Geometry and Vector Algebra : Vector Algebra; Plane Geometry, Problems on Proof; Plane Geometry, Construction Problems; Plane Geometry, Calculation Problems; Solid Geometry, Problems on Proof; Solid Geometry, Calculation Problems.

Binary Arithmetic : Binary addition, Binary Subtraction, Signed Numbers, Two's Complement Representation of Numbers, Addition/Subtraction of Numbers in 2's Complement Notation, Binary Multiplication, Binary Division, Floating Point Representation of Numbers, Arithmetic Operations with Normalized Floating Point Numbers.

Logic Circuit : Switching Circuits, AND/OR/NOT Operations, Parallel and Serial Adapters, I.C, L.S.I and VLSI, Borlean function, duality principles, truth table.

Bibliography and References:

1. V. Govorov, Dybov, Miroshin & Smirnova, *Problems in Mathematics*, CBS Publishers.

Syllabus of BCA FIRST Semester Course

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BCA – 103 : Mathematics – II

Number, Variable, Function : Real numbers, Real numbers as points on a number scale; The absolute value of a real number; Variables and constants; The range of a variable; Ordered variables, Increasing and decreasing variables, Bounded variables; Function; Ways of representing functions; Basic elementary functions, Elementary functions; Algebraic functions; Polar coordinate system.

Limit, Continuity of a Function : The limit of a variable, An infinitely large variable; The limit of a function; A function that approaches infinity, Bounded functions; Infinitesimals and their basic properties; Basic theorems on limits; The limit of the function $\frac{Sin\,x}{x}\,as\,x \rightarrow 0$; The number *e*; Natural logarithms; Continuity of functions; Certain Properties of continuous functions; Comparing infinitesimals.

Derivative And Differential : Velocity of motion; The definition of a derivative; Geometric meaning of the derivative; Differentiability of functions; The derivative of the function $y = x^n$, *n* a positive integer; Derivatives of the function $y = \sin x$, $y = \cos x$; Derivatives of: a constant, the product of a constant by a function, a sum, a product, and a quotient of functions; The derivative of a logarithmic function; The derivative of a composite function; Derivative of the functions $y = \tan x$, $y = \cot x$, $\ln|x|$; An implicit function and its differentiation; Derivatives of: a power function for an arbitrary real exponent, a general exponential function, and a composite exponential function; An inverse function and its differentiation; Inverse trigonometric function and their differentiation; Basic differentiation formulas; Parametric representation of a function; The equations of some curves in parametric form; The derivative of a function represented parametrically; Hyperbolic functions; The differential; The geometric meaning of the differential; Derivatives of different orders; Differentials of different orders; Derivatives (of various orders) of implicit functions and of functions represented parametrically; The mechanical meaning of the second derivative ; The equations of a tangent and of a normal. The lengths of a subtangent and a subnormal; The geometric meaning of the derivative of the radius vector with respect to the polar angle.

Some Theorems On Differentiable Functions : A theorem on the roots of a derivative (Rolle's theorem); The mean-value theorem (Lagrange's theorem); The generalized mean-value theorem (Cauchy's theorem); The limit of a ration of two infinitesimals (evaluating indeterminate forms of the type 0/0); The limit of a ratio of two infinitely large qualities (evaluating indeterminate forms of the type ∞/∞); Taylor's formula; Expansion of the function e^x, $\sin x$, and $\cos x$ in a Taylor series.

Investigating The Behaviour Of Functions : Statement of the problem, Increase and decrease of a function, maxima and minima of functions, Testing a differentiable function for maximum and minimum with a first derivative, Testing a function for maximum and minimum with a second derivative, Maximum and minimum of a function on an interval, Applying the theory of maxima and minima of functions to the solution of problems, Testing a function for maximum and minimum by means of Taylor's formula, Convexity and concavity of a curve.

Points of inflection, Asymptotes, General plan for investigating functions and constructing graphs, Investigating curves represented parametrically.

Complex Numbers, Polynomials : Complex numbers, Basic definitions, Basic operations on complex numbers, Powers and roots of complex numbers, Exponential function with complex exponent and its properties, Euler's formula. The exponential form of a complex number, Factoring a polynomial, The multiple roots of a polynomial, Factoring a polynomial in the case of complex roots, Interpolation. Lagrange's interpolation formula, Newton's interpolation formula, Numerical differentiation, On the best approximation of functions by polynomials, Chebyshev's theory.

Functions Of Several Variables : Definition of a function of several variables, Geometric representation of a function of two variables, Partial and total increment of a function, Continuity of a function of several variables, Partial derivatives of a function of several variables, A geometric interpretation of the partial derivatives of a function of two variables, Total increment and total differential, Approximation by total differentials, Use of a differential to estimate errors in calculations, The derivative of a composite function. The total derivative. The total differential of a composite function, The derivative of a function defined implicitly, Partial derivatives of higher orders, Level surfaces, Directional derivative, Gradient, Taylor's formula for a function of two variables, Maximum and minimum of a function of several variables, Maximum and minimum of a function of several variables related by given equations (conditional maxima and minima), Obtaining a function on the basis of experimental data by the method of least squares, Singular points of a curve.

The Definite Integral : Statement of the problem. Lower and upper sums, The definite integral. Proof of the existence of a definite integral, Basic properties of the definite integral, Evaluating a definite integral. The Newton-Leibniz formula, Change of variable in the definite integral, Integration by parts, Improper integrals, Approximating definite integrals, Chebyshev's formula, Integrals dependent on a parameter. The gamma function, Integration of a complex function of a real variable.

The Indefinite Integral : Antiderivative and the indefinite integral, Table of integrals, Some properties of the indefinite integral, Integration by substitution (change of variable), Integrals of some functions containing a quadratic trinomial, Integration by parts, Rational fractions. Partial rational fractions and their integration, Decomposition of a rational fraction into partial fractions, Integration of rational fractions, Integrals of irrational functions, Integrals of the form $\int R\left(x, \sqrt{ax^2 + bx + c}\right) dx$, Integration of certain classes of trigonometric functions, Integration of certain irrational functions by means of trigonometric substitutions, On functions whose integrals cannot be expressed in terms of elementary functions.

Geometric and Mechanical Applications Of The Definite Integral : Computing areas in rectangular coordinates, The area of a curvilinear sector in polar coordinates, The arc length of a curve, computing the volume of a solid from the areas of parallel sections (volumes by slicing), The volume of a solid of revolution, The surface of a solid of revolution, computing work by the definite integral, Coordinates of the centre of gravity, Computing the moment of inertia of a line, a circle, and a cylinder by means of a definite integral.

Bibliography and References:

1. Piskunov, *Diff. & Integral Calculus*, Vol. I, CBS Publishers & Distributors.

Syllabus of BCA FIRST Semester Course

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BCA – 104 : Microsoft Office XP for Windows

Basic Office Techniques : Basic Office Techniques, Working in Programs.

Microsoft Word : Introducing Word, Entering and Editing Text, Formatting Text, Formatting Pages, Creating Tables, Special Word Techniques, Word and the Web.

Microsoft Excel : Introducing Excel, Entering Data and Formulas, Structuring the Sheet, Formatting the Sheet, Using Excel Charts, Excel Database Techniques, Special Excel Techniques, Excel and the Web.

Microsoft PowerPoint : Introducing PowerPoint, Building a Presentation, Outlining the Presentation, Creating Text Slides, Creating Chart Slides, Formatting Charts, Creating Org Chart and Tables, Customizing a Presentation, Drawing on Slides, Creating Slide Shows, PowerPoint and the Web.

Microsoft Access : Introducing Access, Creating a Database, Creating a Table, Creating a Form, Working with Records, Using Queries, Creating a Report, Access and the Web.

Microsoft Outlook : Introducing Outlook, Reading Messages, Sending Messages, Managing Your Mailbox, Keeping a Contacts List, Scheduling Tasks and Meetings.

Bibliography and References:

1. Steve Sagman, *Microsoft Office XP for Windows*, Pearson Education.

Syllabus of BCA FIRST Semester Course

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BCA – 105 : Principles of Management

Management Science, theory and practice, Management and Society : Social responsibility and Ethics.

The nature and purpose of planning, objectives, strategies, policies and planning premises decision making,

The nature and purpose of organizing, Basic departmentalisation, Line-staff mobility and Decentralization, Effective organizing and organizational culture,

Human resource management and selection, Performance appraisal and career strategy. Manager and organization development.

Managing and the human factor, Motivation, leadership, communication.

The system and process of controlling, Control techniques and information technology, Productivity and operations management, overall and preventive control.

International management : Toward a unified, global management theory.

Bibliography and References:

1. Tripalhi & Reddy, *Principles of Management*, Tata McGraw Hill.

Syllabus of BCA FIRST Semester Course

The course will consists of Six Theory Papers of 80 marks each 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.

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BCA – 106 : Programming With ANSI and Turbo C

Introduction to C : Introduction, About ANSI C Standard, Overview of Compilers and Interpreters, Structure of a C Program, Programming Rules, Executing the Program.

The C Declarations : Introduction, The C Character Set, Delimiters, The C keywords, Identifiers, Constants, Variables, Rules for Defining Variables, data Types, Declaring Variables, Initializing Variables, Type Conversion, Constant and Volatile Variables.

Operators and Expressions : Introduction, Priority of Operators and their Clubbing, Comma and Conditional Operator, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators.

Input and Output in C : Introduction, Formatted Functions, Unformatted Functions, Commonly used Library Functions.

Decision Statements : Introduction, The *If* Statement, The *If …else* Statement, Nested *If…else* Statement, The *break* Statement, The *continue* Statement, The *goto* Statement, The *switch* Statement, Nested *switch( ) … case* Statement, The *switch( ) …case* and Nested Ifs.

Loop Control Statements : Introduction, The *for* Loop, Nested *for* Loops, The *while* Loop, The do…*while* Loop, The do…*while* Statement with *while* Loop.

Arrays : Introduction, Array Initialization, Definition of Array, Characteristics of Array, One-Dimensional Array, Predefined Streams, two-Dimensional Array, Three or Multi-Dimensional Arrays. The *sscanf( )* and *sprintf( )* Functions.

Working with Strings & Standard Functions : Introduction, Declaration and Initialization of String, Display of Strings with Different Formats. String Standard Functions. Applications of Strings.

Pointers : Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operation with Pointers, Pointers and Arrays, Pointer and two-Dimensional Array, Arrays of Pointers, Pointers to Pointers, Pointers and Strings, Void Pointers.

Functions : Introduction, Definition of Function, Declaration of Function and Function Properties, The *return* Statement, Types of Functions, call by values and reference, Function Returning More Values, Function as an Argument, Function with Operators, Function and Decision Statements, Function and Loop Statements, Function with Arrays and Pointers, Recursion, Pointer to Function.

Storage Class : Introduction, Automatic Variables, External Variables, Static Variables, Register Variables.

Preprocessor Directives : Introduction, The *#define* Directives, Undefining a Macro, Token Pasting a Stringizing Operators, The *#include* Directives, Conditional Compilation, The *#ifndef* Directive, The *#error* Directive, The *#line* Directive, Inline Directive, The *#pragma* Saveregs, The *#pragma* Directives, The Predefined Macros In ANSI and Turbo C, Standard I/O predefined Statements in `stdio.h`, The Predefined Macros in `ctype.h`

Structure and Union : Introduction, Features of Structures, Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structures, Structure and Functions, `Typedef`, Bit Fields, Enumerated Data Type, Union, Calling BIOS and DOS Services, Union of Structures.

Files : Introduction, Streams and File Types, Steps for File Operations, File I/O, Structures Read and Write, Other File Functions, Searching Errors in Reading/Writing Files, Low level Disk I/O, Command Line Arguments, Application of Command line Arguments, Environment Variables, I/O Redirection.

Additional in C : Dynamic Memory Allocation, Memory Models, Linked Lists, Graphics.

Bibliography and References:

1. Ashok N. Kamthane, *Programming with ANSI and Turbo C*, Pearson Education.

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Syllabus of BCA SECOND Semester Course

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.

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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 Bi-Stable 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), Hasse 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.

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Syllabus of BCA THIRD Semester Course

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BCA – 301 : OOPs with C++

Getting Started : Object-Oriented Programming Concept , Different Paradigm in OOP, Program Structure in C++,.

Overloading and Information Hiding : Function Overloading, Information Hiding, Friend-More on Information Hiding.

Memory Management in C++ : Introduction, Constructor – Automatic Initialization of Objects, Dynamic Memory Management, Default Constructor, Overloading Constructor, Copy Constructor, Constructor and Information Hiding, Destructor – Automatic Clean up of an Object.

Inheritance : Inheritance – Data and Code Sharing, Class Derivation, Ambiguity in Class Member Access, Virtual Base Class – A Remedy, Class Initialization in Inheritance, Arguments for the Base Class.

Binding and Polymorphism : Bindings in C++, Polymorphism.

Generic Facility : Concepts of Generic Facility, Generic Function, Overloading a generic Function, Generic Classes.

Exception Handling : Basics of Exception Handling, Exception Handling Mechanism, Throwing and Catching Exceptions, Specifying Exceptions.

File Handling in C++ : Concept of Stream in C++, File Positioning Functions, Error Handing During File Operation.

Bibliography and References:

1. D. Samanta, *Object-Oriented Programming with C++ and Java*, PHI.

BCA – 302 : OOPs with Java

Fundamentals of Java : Java Programming Paradigm, Advantages of Java, Tools Available for Java Programming.

Programming in Java : Building Java Applications, Building Java Applets, Differences Between Applet and Application.

Object-Oriented Mechanism in java : Class Definitions in Java, Constructors, Inheritance, Polymorphism in Java, Access Specification in Java.

Interfaces and Packages in Java : Interfaces in Java, Packages in Java.

Exception Handing in Java : Built-in Classes for Exception Handling in Java, Mechanism of Exception Handling in Java, Error Handling Exception classes.

Threads and Multithreads in Java : Basics of a Thread, Synchronization and Inter-Thread Communication, Thread Groups and Daemon.

Application Development in Java : Designing GUI with Components and Layout Managers, Event Handling, Drawing Methods for Graphics Objects.

Java I/O and Networking : Java File I/O, Networking in Java.

Java Multimedia : Multimedia Basics in Java, Web Page in Java.

The Java Applet Package : Class Applet, Interface Applet Context, Interface Applet Stub, Interface Audio Clip.

The Java Language (lang) Package : Class Boolean, Class Character, Class Class, Class Class Loader, Class Compiler, Class Double, Class Float, Class Integer, Class Long, Class Math, Class Number, Class Object, Class Process, Class Runtime, Class Security Manager, Class String, Class String Buffer, Class System, Class Thread, Class Thread Group, Class Throwable, Interface Cloneable, Interface Runnable, Class Arithmetic Exception, Class Array Index Out Of Bounds Exception, Class Array Store Exception, Class Class Cast Exception, Class Class Not Found Exception, Class Clone Not Supported Exception, Class Exception, Class Illegal Access Exception, Class Illegal Argument Exception, Class Illegal Monitor State Exception, Class Illegal Thread state Exception, Class Index Out of Bounds Exception, Class Instantiation Exception, Class Interrupted Exception, Class Negative Array Size Exception, Class No Such Method Exception, Class Null Pointer Exception, Class Number Format Exception, Class Runtime Exception, Class Security Exception, Class String Index Out of Bounds Exception, Class Abstract Method Error, Class Class Circularity Error, Class Class Format Error, Class Error, Class Illegal Access Error, Class Incompatible Class Change Error, Class Instantiation Error, Class Internal Error, Class Linkage Error, Class No Class Def Found Error, Class No Such Field Error, Class No Such Method Error, Class Out of Memory Error, Class Stack Overflow Error, Class Thread Death, Class Unknown Error, Class Unspecified Link Error, Class Verify Error, Class Virtual Machine Error.

The Java Utility (util) Package : Class BitSet, Class Date, Class Dictionary, Class Hashtable, Class Observable, Class Properties, Class Random, Class Stack, Class String Tokenizer, Class Vector, Interface Enumeration, Interface Observer, Class Empty Stack Exception, Class No Such Element Exception.

The Abstract Window Toolkit (AWT) Package : Class Border Layout, Class Button, Class Canvas, Class Card layout, Class Checkbox, Class Checkbox Group, Class Checkbox Menu Item, Class Choice, Class Color, Class Component, Class Container, Class Dialog, Class Dimension, Class Event, Class File Dialog, Class Flow Layout, Class Font, Class Font Matrices, Class Frame, Class Graphics, Class Grid Bag Constraints, Class Grid Bag Layout, Class Grid Layout, Class Image, Class Insets, Class Label, Class List, Class Media Tracker, Class Menu, Class Menu Bar, Class Menu Component, Class Menu Item, Class Panel, Class Point, Class Polygon, Class Rectangle, Class Scrollbar, Class Text Area, Class Text Component, Class Text Field, Class Toolkit, Class Windows, Interface layout Manager, Interface Menu Container, Class AWT Exception, Class AWT Error.

The AWT Image Package : Class Color Model, Class Crop Image Filter, Class Direct Color Model, Class Filtered Image Source, Class Image Filter, Class Index Color Model, Class Memory Image Source, Class Pixel Grabber, Class RGB Image Filter, Interface Image Consumer, Interface Image Observer, Interface Image Producer.

The AWT Peer Package : Interface Button Peer, Interface Canvas Peer, Interface Checkbox Menu Item Peer, Interface Checkbox Peer, Interface Choice Peer, Interface Component Peer, Interface Container Peer, Interface Dialog Peer, Interface File Dialog Peer, Interface Frame Peer, Interface Label Peer, Interface List Peer, Interface Menu Bar Peer, Interface Menu Component Peer, Interface Menu Item Peer, Interface Menu Peer, Interface Panel Peer, Interface Scrollbar Peer, Interface Text Area Peer, Interface Text Component Peer, Interface Text Field Peer, Interface Windows Peer.

The Java I/O Package : Class Buffered Input Stream, Class Buffered Output Stream, Class Byte Array Input Stream, Class Byte Array Output Stream, Class Data Input Stream, Class Data Output Stream, Class File, Class File Descriptor, Class File Input Stream, Class File Output Stream, Class Filter Input Stream, Class Filter Output Stream, Class Input Stream, Class Line Number Input Stream, Class Output Stream, Class Piped Input Stream, Class Piped Output Stream, Class Print Stream, Class Pushback Input Stream, Class Random Access File, Class Sequence Input Stream, Class Stream Tokenizer, Class String Buffer Input Stream, Interface Data Input, Interface Data Output, Interface Filename Filter, Class EOF Exception, Class File Not Found Exception, Class IO Exception, Class Interrupted IO Exception, Class UTF Data Format Exception.

The Java Networking (net) Package : Class Content Handler, Class Datagram Packet, Class Datagram Socket, Class Inet Address, Class Server Socket, Class Socket, Class Socket Impl, Class URL, Class URL Connection, Class URL Encoder, Class URL Stream Handler, Interface Content Handler Factory, Interface URL Stream Handler Factory, Class Malformed URL Exception, Class Socket Exception, Class Unknown Host Exception, Class Unknown Service Exception.

Bibliography and References:

1. D. Samanta, *Object-Oriented Programming with C++ and Java*, PHI.

BCA – 303 : Computer Organization & Architecture

Introduction : Organization and Architecture, Structure and Function, Why Study Computer Organization Architecture.

Computer Evolution and Performance : A Brief History of Computers, Designing for Performance, Pentium and PowerPC Evolution, Recommended Reading and Web Sites, Key Terms, Review Questions, and Problems.

A Top-Level View of Computer Function and Interconnection : Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI, Recommended Reading and Web Sites.

Cache Memory : Computer Memory System, Cache Memory Principles, Elements of Cache Design, Pentium4 and PowerPC Cache Organizations, Recommended Reading.

Internal Memory : Semiconductor Main Memory, Error Correction, Advance DRAM Organization, Recommended Reading and Web Sites.

External Memory : Magnetic Disk, RAID, Optical Memory, Magnetic Tape, Recommended Reading and Web Sites.

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 – Fire Wire and InfiniBand, Recommended Reading and Web Sites.

Operating System Support : Operating System Overview, Scheduling, Memory Management, Pentium II and PowerPC Memory Management, Recommended Reading and Web Sites.

Computer Arithmetic : The Arithmetic and Logic unit, Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic, Recommended Reading and Web Sites.

Instruction Sets – Characteristics and Functions : Machine Instruction Characteristics, Types of Operands, Pentium and PowerPC Data Types, Types of Operations, Pentium and PowerPC Operation Types, Assembly Language, Recommended Reading.

Instruction Sets – Addressing Modes and Formats : Addressing, Pentium and PowerPC Addressing Modes, Instructions Formats, Pentium and PowerPC Instruction Formats, Recommended Reading.

Processor Structure and Function : Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The Pentium Processor, The PowerPC Processor, Recommended Reading.

Reduced Instruction Set Computer : Instruction Execution Characteristics, The Use of a Large Register File, Compiler-Based Register Optimization, Reduced Instruction Set Architecture, Risk Pipelining, MIPS R4000, SPARC, RISC Versus CISC Controversy, Recommended Reading.

Instruction-Level Parallelism and Superscalar Processor : Overview, Design Issues, Pentium, PowerPC, Recommended Reading.

The IA-64 Architecture : Motivation, general Organization, Prediction, Speculation, and Software Pipelining, IA-64 Instruction Set Architecture, Itanium Organization, Recommended Reading and Web Sites.

Control Unit Operation : Micro-Operations, Control of the Processor, Hardwired Implementations, Recommended Reading.

Microprogrammed Control : Basic Concepts, Microinstruction Sequencing, Microinstruction Execution, Ti 8800, Recommended Reading.

Parallel Processing : Multiple Processor Organizations, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters, Non-uniform Memory, vector Computation, Recommended Reading and Web Sites.

Number System : The Decimal System, The Binary System, Converting between Binary and Decimal, hexadecimal Notation.

Digital Logic : Boolean Algebra, Gates, Combinational Circuits, Recommended Reading and Web Sites.

Bibliography and References:

1. William Stalling, *Computer Organization and Architecture*, Pearson Education.

BCA – 304 : Database Management System

Introduction : Concept of System, Types of Decisions – Decision Based on the Levels of the Organization, Decisions Based on the Structuredness; Information System – Components of Information System; Classification of Information System – Management Information System(IMS), Decision Support Systems(DSS), Expert System(ES); Conventional File Processing System – Example of Conventional File Processing System, Drawbacks of Conventional File Processing System; Database System – Definition of Database System, Advantages of Database System, Components of Database Management System, Economic Justification of Database Approach,

Database Concepts : Data, Information, Metadata, Terminologies of a File, Association between Fields, Association between Files (Record Types) – One-to-One Association, One-to-Many Association, Many-to-Many Association, Multiple Association, One-to-One Conditional Association, Recursive Association; File Organization – Terminologies of Storage Area, Sequential File Organization, Indexed Sequential File Organization.

Data Structure : Location Methods – Address Sequential Data Direct Placement, Address Sequential Data Indirect Placement, Pointer Sequential Connection with Data Direct Placement, Pointer Sequential Connection with Data Indirect Placement; Types of Pointer – Physical Address Pointer, Relative Address Pointer, Logical Key Pointer; Inter Record Data

Structure – Stack Data Structure, Queue Data Structure, Sorted List Data Structure, Ring Data Structure, Inverted List Data Structure, Multi-List Data Structure, Tree Data Structure.

Data Models : Data Model, Classification of Data Model – Hierarchical Data Model, Network Data Model, Relational Data Model; Entity Relationship Model.

Database Design : Steps of Database Design – Requirement Analysis, Design of Conceptual Data Model, Design of Internal Model/Implementation Design, Design of Physical Data Model; Normalization, Case Problem – Normalization of Invoice Report, Normalization of Reorder Report, View Integration, Design of Conceptual Data Model; Data Volume and Usage Analysis – Data Volume Analysis, Usage Analysis; Integrated Case Study – Database Design for Academic Institution – Normalization of Reports, View Integration, Design of Conceptual Data Model, Preliminary Map and Logical Access Maps to Print the Report.

Implementation Design : Implementation Design, Guidelines for Mapping Conceptual Data Model into a Desired Logical Data Model – Mapping Conceptual Data Model into Relational Data Model, Mapping Conceptual Data Model into Network Data Model, Mapping Conceptual Data Model into Hierarchical Data Model; Problem Design Guideline – Database Action Diagram (DAD), Example of Database Action Diagram (DAD).

Hierarchical Database Management Systems : Information Management System (IMS) – IMS Database Description (DBD), IMS Data Manipulation (DL/I); PC-Focus – PC-Focus Database Description, PC-Focus Data Manipulation.

Network Database Management Systems : Integrated Database Management System (IDMS) – Data Description Language (DDL), Data Manipulation Language (DML) of IDMS.

Relational Database Management Systems : Relational Algebra, Relational Calculus Commands; Relational Database Languages, Interactive SQL – Interactive SQL DDL, Interactive SQL DML.

Database Operations and Maintenance : Database Administration (DBA), Security Mechanisms – User with Password and Complete Authorization, User with Password and Limited Authorization, Encryption; Concurrency Control – Problem of Concurrent Access, Resource Locking, Deadlock/Deadly Embrace; Database Recovery – Restore/Return, Backward Recovery, Forwarded Recovery.

Database Design for Students Fee Collection System of Global Institute Technology : Case Description, Normalization of Reports, View Integration, Design of Conceptual Data Model, LAM for Different Reports.

Database Design for Stores Operations of Devi Engineering Works : Case Description, Normalization of Reports, View Integration, Design of Conceptual Data Model, LAM for Different Reports.

Bibliography and References:

1. R. Pannerselvam, *Database Management System*, PHI.

BCA – 305 : Computer Graphics

Applications : Presentation Graphics, Education and Training, Entertainment, CAD for Architecture, Mechanical, Aeronautical and Automobile Industry, Other Areas: Simulation, Animation and Video Games.

Graphical Devices : Display, Hardcopy Devices, Input Devices.

Drawing Geometry : Mathematics for Computer Graphics, Line Drawing and 2D Transformation.

Conics and Curves : Bresenham's Circle Drawing Algorithm, Generation of Ellipse, Curve Drawing.

Graphical Operations : Clipping, Filling.

3D Graphics : Transformations, Parallel Projection, Perspective Projection, Hidden Surface Removal.

Illumination and Shading : Illumination, Shading.

Tweening and Morphing : What is Tweening?, Morphing: The Wrap and The Dissolve.

Graphic Standards : Introduction to GKS Primitives, MS-Windows, AutoCAD.

Multimedia : Concepts of HyperText/Hypermedia, Multimedia Applications, Multimedia Authoring, Multimedia Hardware, Images, Bitmaps, Windows Paintbrush, Languages of Sound: Digital sound, Playing, A Few Currently Available Multimedia Software's, Virtual Reality.

Bibliography and References:

1. D. P. Mukherjee, *Fundamental of Computer Graphics and Multimedia*, PHI.

BCA – 306 : Practicals

Practical based on the topics covered in the semester.

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Syllabus of BCA FOURTH Semester Course

The course will consists of Four Theory Papers of 80 marks each and Two Project Papers 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 – 401 : Operating Systems

Computer System Overview : Basic Elements, Processor Registers, Instruction Execution, Interrupt, The Memory Hierarchy, Cache Memory, I/O Communication Techniques.

Operating System Overview : Operating System Objectives and Functions, The Evolution of Operating Systems, Major Achievement, Developments Leading to Modern Operating Systems, Microsoft Windows Overview, Traditional UNIX Systems, Linux.

Process Description and Control : Process, Process State, Process Description, Process Control, UNIX SVR4 Process Management.

Threads, SMP and Microkernel : Process and Threads, Symmetric Multiprocessing, Microkernel, Windows Threads and SMP Management, Solaris Thread and SMP Management, Linux Process and Thread Management.

Mutual Exclusion and Synchronization : Principle of Concurrency, Mutual Exclusion, Hardware Support, Semaphores, Monitors, Message Passing, Readers/Writers Problem.

Deadlock and Starvation : Principles of Deadlock, Deadlock Preservation, Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategy, Dining Philosophers Problem, UNIX Concurrency Mechanism, Linux Kernel Concurrency Mechanisms, Solaris Thread Synchronization, Windows Concurrency Mechanisms.

Memory Management : Memory Management Requirements, Memory Partitioning, Paging Segmentation.

Virtual Memory : Hardware and Control Structures, Operating System Software, UNIX and Solaris Memory Management, Linux Memory Management, Windows Memory Management.

Uniprocessor Scheduling : Types of Processor Scheduling, Scheduling Algorithms, Traditional UNIX Scheduling.

Multiprocessor and Real-Time Scheduling : Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX SVR4 Scheduling, Windows Scheduling.

I/O Management and Disk Scheduling : I/O devices, Organization of the I/O Function, Operating System Design Issue, I/O Buffering, Disk Scheduling, RAID, Disk Cache, UNIX SVR4 I/O, Linux I/O, Windows I/O.

File Management : Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, UNIX File Management, Linux Virtual File System, Windows File System.

Networking : The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, Sockets, Linux Networking,.

Distributed Processing, Client/Server and Clusters : Client/Server Computing, Distributed Message Passing, Remote Procedure Calls, Clusters, Windows Cluster Server, Sun Cluster, Beowulf and Linux Clusters.

Distributed Process Management : Process Migration, Distributed Global States, Distributed Mutual Exclusion, Distributed Deadlock.

Security : Security Threats, Protection, Intruders, Malicious Software, Trusted Systems, Windows Security.

Bibliography and References:

1. William Stalling, *Operating System Internals and Design Principles*, Pearson Education.

BCA – 402 : UML and JAVA

Unified Modeling Language : UML, Goals of UML, Use UML, Diagrams of UML – Use Case Diagram, Class Diagram, Sequence, Diagram, Collaboration Diagram, Statechart Diagram, Activity Diagram, Component Diagram, deployment Diagram.

Use Cases : Introduction to Use Case – System, Actor, Use Cases, Use Case Bundles; Documenting Use Cases – Use Case Diagram, Sequence Diagram, Textual Description; Guideline for Developing Use Cases – Avoiding Analysis Paralysis, Identifying Actors, Identifying High-Level and Essential Use Case, Establishing Use Case Bundles, Developing Use Case Details, Identifying Supporting Use Cases, Developing Boundary Use Case; Contracts.

Finding the Objects : Object-Oriented Analysis: Model of an Application Domain, Building the OO Model, Identification of Objects, Current Techniques, Traditional techniques.

Identifying Responsibilities : Object, Attributes – Descriptive Attributes, Naming Attributes; Service, Method, Identifying Attributes, Specifying Attributes, Identifying Services, Specifying Services.

Static Behavior : Behavior, Techniques for Specifying static Behavior, Techniques for Specifying Control, Techniques for Documenting Control, techniques for Documenting Static Behavior.

Dynamic Behavior : Techniques for Identifying Dynamic Behavior, Identifying and Specifying Events, Specifying Dynamic Behavior, Documenting Dynamic Behavior.

Relationships : Relationships, Generalization/Specialization, Identifying Generalization/ Specialization, Object Aggregation, Classification of Aggregation, Links between Objects, Identifying and Specifying Links and Aggregations, Managing Relationships, Documenting Relationships,.

Rules : Rules, Identifying Declarative Statements, Specifying and Documenting Rules, Mapping Rules to the Proper OO Concept, Documenting the Rules Using UML, Implementing Rules.

The Model : Concepts and Object-Oriented Model, Documenting Concepts Using UML, Refining the Model, Subsystems, Organizing Subsystems, Identifying Subsystems, Documenting Subsystems.

Design : System Design, Detailed Design.

Implementation : Implementing Static Behavior, Implementing Dynamic Behavior, Instantiating and Deleting Objects, Implementing Generalization/Specialization, Implementing More relationships.

Bibliography and References:

1. Martin, *UML for Java Programmers*, Pearson Education.
2. Stevens, *Using UML* 2/e, Pearson Education.

BCA – 403 : Visual Basic Programming

Visual Basic Application : Introduction, Developing a Visual Basic Application, Using the Application Wizard.

The Visual Basic Environment and Help System : The Visual Basic Interface, Using the Menu Bars, Toolbars, Toolbox, The SDI Environment, Custom Controls and Components.

Customizing a Form and Writing Simple Programs : Starting a New Project, The Properties Windows, Common Form Properties, Making a Form Responsive, Printing a Visual Representation of a Form, Typos, Creating Stand-Alone Windows Programs.

Steps in Building the User Interface : Creating Controls, Common Controls of Toolbox, Navigating between Controls, Message Boxes, The Grid, The Display in Visual Basic, The ASCII Representation of the Forms.

First Step in Programming : The Code Window, Visual Basic Editing tools, Statements in Visual Basic, Variables, Setting Properties with Code, Data Types, Working with Variables, More on Strings, More on Numbers, Constants, Input Boxes.

Displaying Information : Displaying Information on a Form, The Format Function, Picture Boxes, Rich Text Boxes, The Printer Object.

Controlling Program Flow : Determinate Loops, Indeterminate Loops, Making a Decisions, Select Case, Nested If…Then's, The GoTo Statements.

Built-In Functions : String Functions, The Like Function and Fuzzy Searching, The RND Function, Bit-Twiddling Functions, Numeric Functions, Date, Time and Financial Functions.

Writing Your Own Functions and Procedures : Function Procedures, Sub Procedures, Advanced Uses of Procedures and Functions, Using the Object Browser to Navigate among Subprograms.

Organizing Information via Code : Lists – One-Dimensional Arrays, Multi-Dimensional Arrays, Using Lists and Arrays with Functions and Procedures, The New Array-Based String, Sorting and Searching, Records (User-Defined Types), The With Statement, Enums.

Organizing Information via Controls : Control Arrays, List and Combo Boxes, The Flex Grid Control.

Building Larger Projects : Projects with Multiple Forms, Code Modules, The DoEvent Function and Sub Main, Accessing Windows Functions, Error trapping.

VB Objects and an Introduction to Object-Oriented Programming : The Object Browser, Manipulating Objects Built into Visual Basic, General Object Variables, Collections, Object-Oriented Programming, Creating an Object in Visual Basic, Building Your Own Classes.

Finishing the Interface : Visual Basic Displays, Other Control on Toolbox, Common Dialog Boxes, The Microsoft Windows Common Controls 6.0, Menus, MDI Forms, Making Form Independent of Resizing and Screen Resolution, Building Help Systems.

Tools and Techniques for Testing, Debugging, and Optimization : Testing, Bugs, The Immediate Windows, The Debugging Tools, Stopping Programs Temporarily, Final Remarks on Debugging.

An Introduction to Graphics : Fundamentals of Graphics, Screen Scales, The Line and Shape Controls, Graphics via Code, Lines and Boxes, Circle, Ellipses, and Pie Charts, Curves.

Monitoring Mouse Activity : The Mouse Event Procedures, Drag & Drop Operations.

Basic File Handling : File Commands, Sequential Files, Random-Access Files, Binary Files, Sharing Files, Adding Licensing Screens, Keeping File Information Secret.

File System Controls and File System Objects : File System Controls, The File System Objects.

Communicating with Other Windows Applications : The Clipboard, The Shell Function, Sending Keystrokes to the Active Windows Application, Overview of COM/OLE, OLE Automation, Building COM/OLE DLL Servers, OLE Drag and Drop.

Recursion : Recursion, Recursive Sorts, Fractals, Uses of Recursion.

Database Development Using Visual Basic : Modern Database, Using the Data Control, Structured Query Language (SQL), An Introduction to Programming with Database Objects, Methods and Events for the Data Control, Monitoring Changes to the Database, The Data Form Wizard.

Building Your Own ActiveX Controls : Testing the Control, Presentation of Your Control, Adding the Functionality, The Life Cycle of a Control, The Full Code for the Numeric Text Box, Sample Code for Using the Control.

Distributing Your Application : Building the Executable, The Package and Development Wizard.

Bibliography and References:

1. Gary Cornell, *Visual Basic 6 from the Ground Up*, Tata McGraw-Hill.

BCA – 404 : C# Programming

Evolution of Object-Oriented Software Development : Problem Solving Using Computers, Styles of Programming, Complexity of Software, Software Crisis, Software Engineering Principles, Natural Way of Solving a Problem, Abstraction, Interface and Implementation, Encapsulation, Comparing Natural Way of Problem Solving with Conventional Programming Method of Problem Solving, Object Model, Classes and Objects, Data Abstraction and Encapsulation, Modularity, Design a Class, Design Strategies in OOP, Comparison of Structured Programming and OOP, Object-Oriented Programming Languages, Requirements of Using OOP Approach, Advantages of Object-Oriented Programming, Limitations of Object-oriented Programming, Features of Object-Oriented Programming, Applications of Object-Oriented Programming.

Basic Elements of C# : .NET Framework, C# Language, Features of C#, Compilation of a C# Program, Character Set of C#, Lexical Elements of C#, Escape Sequences, Identifiers, Keywords, Concept of Data, Operators, Punctuators, Preprocessing Directives, Declarations of Primitive Data Types.

C# Program Structure and Simple I/O Operations : Class, C# Program Structure, Method, Instance Methods, A Simple C# Program, Simple I/O Operations, Creation of Objects Using *new* Operator, Member Access, Invoking a Method, Types of Parameters, Constructor, Destructor, Default Constructor, The *this* Reference, Access Modifiers, Static Members, Formatted Output, Header of *main( )* Method, Enumeration.

Operators and Expressions : Classification of Operators, Arithmetic Operators, Relational and Equality Operators, Logical Operators, Assignment Operators, Conditional Operator or Ternary Operator, Type Conversion, String Concatenation, The *is* Operator, The checked and unchecked Operators, Categories of Expressions, Side Effect, Operator Precedence and Associativity.

Statements : Classification of Statements, Expression Statement, Control Flow Statements, Block, Declaration Statement, Empty Statement, Exception Handling, The Lock Statement, The Labeled Statement, The checked and unchecked Statements.

Array and Structures : Arrays in C#, Classification of Arrays, Creation of Arrays, Creation of Regular Arrays, Creation of Jagged Arrays, Rank and Element Type of Arrays, Reading and Writing of Arrays, Creation of Two-Dimensional Jagged Arrays, Creation of Three-Dimensional Jagged Arrays, Difference Between Regular and Jagged Arrays, Initialization of Arrays, Initialization of Jagged Arrays, Creation of Field and Local Arrays and Initialization, Features of Arrays, System Array, Passing Array as a Parameter, Application of Arrays, Recursive Methods, Structure, Nested Structures.

Inheritance : Inheritance, Uses of Inheritance, Derived Class, Syntax for Derived Class, Ultimate Base Class, Implementing Inheritance, Types of Inheritance, .NET Building Blocks, Accessibility, namespaces, Inner Classes, Name Hiding Through Inheritance, Virtual and Override Methods, Dynamic Binding, Abstract Method and Abstract Class, Sealed Classes and Sealed Methods, Characteristics of Inheritance, Restrictions on Accessibility, Advantages of Inheritance.

Interface and Operator Overloading : Interface, Declaration and Implementation of Interfaces, Polymorphism in Interfaces, Multilevel Inheritance, Multiple Inheritance, Explicit Interface Member Implementations, Validating Interfaces, Problems in Interfaces Because of Inheritance, Property, Purpose of Property, Classification of Properties, Inheritance and Property, Properties in Interfaces, Indexers, Delegates, Syntax of Delegate, Multicasting Delegates, Publish/Subscribe Design Pattern, The event Feature in C#, Operator Overloading, Operator Method Declaration for Operator Overloading, The User-Defined Type Conversion, Method Overloading, Collection Interfaces, Variable Method Parameter Lists.

Data Structures : Classification of Data Structures, Operations on Data Structures, Commonly Used Data Structures, Implementation of Data Structures.

File Operations and Multithreading : Stream, File Management System, File Operations, File Management Operations, Stream-Oriented Operations, Multitasking, Multithreading, Threads and Operations of Threads, Secondary Threads, Thread Operations, Synchronization.

Bibliography and References:

1. S. Thamarai Selvi & R. Murugesan, *A Textbook on C#*, Pearson Education.

BCA – 405 : Projects

Two Projects based on Theory Paper BCA – 403.

BCA – 406 : Projects

Two Projects based on Theory Paper BCA – 404.

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Syllabus of BCA FIFTH Semester Course

The course will consists of Four Theory Papers of 80 marks each and Two Project Papers 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 – 501 : Web Site Development and Commercial Application

Introduction to Internet : Domains, Virtual Domain, IP Address, TCP/IP and its Services, WWW & Telnet, Web Server.

SGML and HTML : Introduction, Structure and HTML Page, Text Formatting, Heading and Drawing Style, Text Style, List Creation, Graphics Tag, Table, Colspan & Rowspan, Linking Documents, External and Internal Linking, Frames & Frameset, Marquee.

Cascading Style Sheet : Cascading Style Sheet Creation, Font, Color, Margin, List in CSS.

Common Gateway Interface : Introduction, CGI URL Interpreted by Web Server, CGI Program Format, PERL Baric and PERL String, Variables in PERL, Array and Index Array, Hash Array, Operators in PERL, Control Statement, Condition and Looping in PERL, Functions – String Functions, Array Functions, Math Functions, Input/Output in PERL, File Handling in PERL, Directory Management, Pattern Matching Operator and Function, Subroutine Creating, Argument Passing in Subroutine, Library in PERL, Object Type Programming in PERL, PERL Package and Module.

Database Connectivity : Features, ODBC Object Method, Debugging Command & Technique in PERL.

JavaScript : Introduction to JavaScript in Web Pages, Advantages of JavaScript, Program Format, Data Types and Variables, Operators, Array Creation, Conditional and Looping Statement, Pre-Defined Functions, User Function Creation, Existing Dialog Box, Brower Object in JavaScript, Event Handling in JavaScript, Form Creation on Web Pages, Different Form Button, Built-In Objects in JavaScript.

Bibliography and References:

1. IVan Bayross, *HTML, DHTML, JavaScript, Perl CGI*, BPB.

BCA – 502 : Software Engineering

Software Engineering : The Role of Software Engineering in System Design, History of Software Engineering, The Role of Software Engineer, The Software Life Cycle, The Relationship of Software Engineering to Other Areas of Computer Science, The Relationship of Software Engineering to Other Disciplines.

Software Nature and Qualities : Classification of Software Qualities, Representative Qualities, Quality Requirement in Different Application Areas, Measurement of Quality.

Software Engineering Principles : Rigor and Formality, Separation of Concerns, Modularity, Abstraction, Anticipation of Change, Generality, Incrementality, Applications of Software Engineering Principles to Compiler Construction and System Engineering.

Design and Software Architecture : The Software Design Activity and its Objectives, Modularization Techniques, Handling Anomalies, A Case Study in Design, Concurrent Software, Object-Oriented Design, Architecture and Components.

Specification : The Uses of Specifications, Specification Qualities, Classification of Specification Styles, Verification of Specifications, Operational Specifications, Descriptive Specifications, Building and Using Specifications in Practice.

Verification : Goals and Requirements of Verification, Approaches to Verification, Testing, Analysis, Symbolic Execution, Model Checking, Putting it All Together, Debugging, Verifying Other Software Properties.

The Software Production Process : What is a Software Process Model?, Why are Software Process Models Important?, The Main Activities of Software Production, An Overview of Software Process Models, Dealing with Legacy Software, Case Studies, Organizing the Process, Organizing Artifacts: Configuration Management, Software Standards.

Management of Software Engineering : Management Functions, Project Planning, Project Control, Organization, Risk Management, Capability Maturity Model.

Software Engineering Tools and Environments : Historical Evolution of Tools and Environments, Dimensions for Comparing Software Tools, Representative Tools, Tool Integration, Forces Influencing the Evolution of Tools.

Epilogue : The Future, Ethics and Social Responsibility, Software Engineering Code of Ethics.

Bibliography and References:

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, *Fundamentals of Software Engineering*, PHI.

BCA – 503 : .NET Programming

Introduction to Programming : Introduction, What is a Program?, Role Played by a Program to Perform a Task, What is a Programming Language?, Types of Programming Languages: High Level Language, Assembly Language, Low Level Language, High Level to Low Level Language Conversion, Using Interpreters, Using Compiler, Program Development Life Cycle, Analyzing the Problem, Developing a Solution: Coding the Solution, Testing and Debugging the Program, Object Oriented Programming (OOP), Encapsulation, Abstraction, Inheritance, Polymorphism, Event-driven Programming.

.NET Programming : What is .NET?, .NET Framework, Common Language Runtime (CLR), CLR Vs JVM, Base Class Library (BCL), Common Language specifications (CLS), Common Type System (CTS), Microsoft Intermediate language (MSIL), Metadata, Assemblies, Managed Code, Garbage Collection, Languages in .NET.

Introduction to Visual Studio 2005 : System Requirements, Installing Visual Studio 2005, Installing IIS 6.0, Installing Visual Studio 2005, Opening Visual Studio 2005, Visual Studio 2005, Integrated Development Environment, Title Bar, Menu Bar, Toolbar, Toolbox Solution, Explorer Window, Properties Window, Design Window, Code Window, Project Designer, Intelligence-Writing, Correct Code Symbolic Renaming.

Bibliography and References:

1. Vikas Gupta, *.NET Programming,* Dreamtech.

BCA – 504 : ASP.NET

ASP.NET 2.0 Essentials : Introduction to ASP.NET, Versions of ASP.NET, Benefits of ASP.NET, Robust Database-driven, Functionality, Faster Web Applications, Memory Leak and Crash Protection, Easy Deployment, Multiple Development, Language Support. What's New in ASP.NET 2.0? Developer, Productivity, Administration and Management, Performance and Scalability, Introducing ASP.NET 2.0 IDE, Visual Web Developer.

Developing a Web Application : History of Web Applications, HTML, DHTML Scripting Languages, Server-side Languages, PHP, JSP, PERL. Anatomy of ASP .NET 2.0, ASP.NET 2.0, Provider Model, ASP .NET 2.0 Coding Models, Inline Code Model, The Code-Behind Model, Code Sharing, Using the App. Code Folder, Using the Bin Folder, Using the Global Assembly Cache, Compilation in ASP .NET 2.0, Managing States of an ASP .NET Application, The Application-State, The Session-State, The View-State, Using Application-State, Session-State, and View-state.

Standard Controls : Introducing Controls, Designer Support for Controls, Introduction to Standard Controls, Web Control Class, Label Control, Changing Properties of a Label Control, TextBox Control, Setting Properties of a TextBox Control, Button Control, Setting Properties of a Button Control, Handling Events of a Button Control, ImageButton Control, Setting Properties of a ImageButton Control, ListBox Control, Setting Properties of a ListBox Control, RadioButton. Control, Setting Properties of a RadioButton Control, Handling Events of a RadioButton Control.

Bibliography and References:

1. Vikas Gupta, *.NET Programming,* Dreamtech.

BCA – 505 : Projects

Two Projects based on Theory Paper BCA – 501.

BCA – 506 : Projects

Two Projects based on Theory Paper BCA – 504.

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Syllabus of BCA SIXTH Semester Course

The course will consists of Four Theory Papers of 80 marks each and Two Project Papers 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 – 601 : Data and Computer Communication

Data Communications : Data Transmission, Transmission Media, Data Encoding, The Data Communication Interface, Data Link Control, Multiplexing.

Wide Area Network : Circuit Switching, Packet Switching, Frame Relay, Asynchronous Transmission Mode (ATM).

Local Area Network : LAN Technology, LAN Systems, Bridges.

Communication Architecture and Protocols : Protocol and Architecture, Internetworking, Transport Protocols, Network Security, Distributed Applications, Glossary.

Bibliography and References:

1. William Stalling, *Data and Computer Communications*, Fifth Edition, Pearson Education.

BCA – 602 : Cryptography and network Security

Classical Encryption Technique, Cipher Model, Substitution Technique, Transposition & Rotol Technique, Steganography, Simplified DES, Differential & Linear Cryptanalysis, Cipher Design Principle and Modes of Operation.

Finite Fields : Group, Ring, Field, Modular Arithmetic, Euclid's Algorithm, GF(p) Form, Polynomial Arithmetic, AES, Triple DES, RC5 & RC4, Encryption Function, Traffic Confidentially, Key Distribution & Random Number Generation.

Number Theory : Fermat's & Euler's Theorems, Testing of Primality, Chinese Remainder Theorem, Discrete Logarithms, Public Key Cryptography, RSA, Diffic-Hellman Key Exchange, Elliptic Curve Algorithm & Cryptography, Authentication Requirement & Function.

Message Authentication Code, Hash Function & their Security & MACs, MD5 Digest Algorithm, RIPEMD-160, HMAC-390.

Digital Signature & their Standard, Authentication Protocol, Authentication Application, Electronic Mail Security, IP Security, IP Security Architecture, Encapsulation Security Payload, Web Security & Secure Socket & Transport Layer Security, Intruders, Malicious Software, Firewalls.

Bibliography and References:

1. William Stalling, *Cryptography & Network Security Principles & Practices*, Pearson Education.

BCA – 603 : Artificial Intelligence

AI and Foundation of AI, Intelligent Agents Environments, Structure of Agents, Problem Solving Agents, Toy Problems, Uniform Search Strategy, Avoided Repeated States, Security Partial Information, Informed Search Strategy, Heuristic Function, Search Algorithm and Optimization Problem, Constraint Satisfaction Problems, Games & Optimal Decision in Games, Alpha-Beta Pruning.

Knowledge Based Agent, Propositional Logic, Reasoning Patterns, First Order Logic Model, Interface in First-Order Logic, Forwarded Chaining, Backward Chaining, Ontological Engineering, Action, Situation & Events, Mental Event & Mental Object, Internet Shopping World, Semantic Network and Description Logic, Planning Problem, Planning with State Search, Partial Order Planning, Planning Graph, Planning & Activity in Real World, Uncertain Knowledge Reasoning, Probabilistic Language Processing, Machine Translation, Perception, Image Processing & Object Recognition.

Bibliography and References:

1. Stuart Russell & Peter Norvig, *Artificial Intelligence*, Pearson Education.

BCA – 604 : Oracle & Developer

Introduction to Oracle and their different version: Different Oracle Tools, Database and RDBMS, OORDBMS, Oracle Database Administration, SQL * Plus, PL/SQL, SQL, Database Component, Table Spaces, Stored procedure, Trigger, Cursor, Procedure and Function, Oracle Data Type, Operation, Creation of Database Component, Modifying Component, Data Constraints, Column Level Constraints and Table Level, Operator and Expression List, Range Searching and grouping Data, Joining, Subquery Indexes, Views, Sequences, Granting Permission, Revoke Operation, PL/SQL Block Structure with Iterative Control, Transaction Control and Concurrency Control, Locks, Cursors, Cursors for Loops, Error handling in PL/SQL, Stored Procedure and Function, Types of trigger and their Use, Raise_Application_Error Procedure, Oracle Form, Development with Developer 2000, Form Components, Form Module, Item, Canvas, Window Part of Form Designer, Tools for Form Designer, Running Form, Layout Editor, Data Navigation with Oracle Form, Property Class with Visual Attributes, Library and Alerts, Displaying Context Sensitive Help, Working with LOV Objects Using Radio-Buttons, Cross Table Updation, Parameter Passing in Forms, Multiple Canvas on Form menus, Assigning Command to a Menu, Opening Form Through the Menu Toolbar Basic, Report, Layout of Reports, Boilerplate, Oracle Report Interface, Assigning the Layout, Creating a Break Report, Creating a Matrix Report.

Bibliography and References:

1. Ivan Bayross, *Oracle & Developer,* BPB.

BCA – 605 : Projects

Two Projects based on Theory Paper BCA – 603.

BCA – 606 : Projects

Two Projects based on Theory Paper BCA – 604.

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