BCA Program

BCA - I Semester						
Code	**Description**	**Pd/w**	**Exam**	**CIA**	**ESE**	**TOTAL**
BCA111	Programming in C	3	3 hrs	20	80	100
BCA112	Web Designing	3	3 hrs	20	80	100
BCA113	Fundamentals of Computer	3	3 hrs	20	80	100
BCA114	Mathematics I	3	3 hrs	20	80	100
BCA115	Communicative Skills	3	3 hrs	20	80	100
BCA121	C L anguage Lab	4	3 hrs	20	80	100
BCA122	Office Automation Lab	4	3 hrs	20	80	100
BCA123	Web Design Lab	4	3 hrs	20	80	100
	TOTAL					**800**

Unit	BCA111: Programming in C
I	Concept of programming, algorithms and flowcharts, data types, structure of C program, constants and variables, arithmetic operators, library functions, expressions, input/output statements, compound statements and blocks.
II	Operators - relational, logical, bit wise, unary, hierarchy of operators. Control statements - if-else, nested if, switch case, goto and labels, looping statements - while, do-while and for, nested loops, break and continue.
III	Introduction of arrays - one-dimensional and multidimensional arrays, structures – simple and compound, unions, processing a structure. Pointers – declaration, increment and decrement operation, pointer to array, array of pointers, pointers to structures
IV	Functions - defining and accessing a function, function arguments, call by value, call by reference, calling functions with arrays, external, state and register variables, scope of variables, local and global variables, type conversion, block structure, recursion
V	Introduction of strings, library functions of strings - strlen, strcpy, strcat, strcmp. File handling – file input/output statements, creating, reading, writing and modifying files

Suggested Readings

- Let Us C, Yashavant P. Kanetkar , BPB Publications
- Programming in ANSI C, Balaguruswamy, Mc Graw Hill

Unit	BCA112: Web Design
I	Internet: History of the World Wide Web, difference between internet and intranet, web browser and its functions, URLs, web sites, domain names, search engines. Brief introduction to internet protocols – TCP/IP and UDP
II	Introduction of HTML: markup language features, uses and versions, elements of html: syntax, head and body sections, DOCTYPE tag, character formatting tags: B,U,I,SUB,SUP etc. Drawing ruler with HR tag. Creating lists: OL tag and its attributes START, TYPE and VALUE, UL tag and its attribute TYPE, LI tag. Using font: FONT tag and attributes like SIZE, COLOR and FACE. Inserting texts, text alignment.
III	Image Element: IMG tag and its attributes SRC, ALT, ALIGN, BORDER, WIDTH and HEIGHT. Presenting information in Table: Tags like TABLE, TR, TD and TH, Use of ROWSPAN and COLSPAN. Frames: Dividing window with frames using FRAME and FRAMESET tag, inline frame using IFRAME tag
IV	Anchor tag A and its various attributes HREF, TITLE, NAME ACCESSKEY and TARGET, Images and Text as hyper link. Hyperlink and table elements. Forms: Use or FORM tag, Understanding of widgets, <INPUT> Tag, use of Submit and Reset Buttons, Forms processing (Action and Method).
V	Dynamic HTML: CSS: Introduction – inline styles, creating style sheets with the style

	element, Conflicting styles, linking external style sheets, user style sheets.

Suggested Readings

- HTML Complete, BPB Publication (Sybex)
- Internet and World Wide Web, H.M.Deitel, P.J.Deitel, A.B.Goldberg, Pearson -Prentice Hall

Unit	BCA113: Fundamentals of Computer
I	Introduction to Computer, Characteristics of Computers, Generation of Computers, Classification of Computer, Basic Computer Orgnaisation, Applications of Computers, Input Devices, Output Devices, Soft Copy Devices, Hard Copy Devices
II	Introduction to Computer Memory, Memory Hierarchy, Processor Registers, Cache Memory, Primary Memory, Secondary Memory, Storage Devices- Hard Disk, Optical Drives, USB Flash drive, Memory Card, Mass Storage Devices, Introduction to Computer Software, Classification of Computer Software- System, Application, Firmware, Middleware.
III	Introduction to Operating System, Evolution, Process Management, Memory Management, File Management, Device Management, Security Management, Command Interpreter, Algorithm, Control Structures, Flowcharts, Pseudocode, Programming Languages, Generation of Programming Languages, Categorization of High level Languages, Popular High Level Languages
IV	Introduction to Networking, Connecting Media, Data Transmission Mode, Data Multiplexing, Data Switching, Data Routing Techniques, Networking Topologies, Type of Network, Networking Devices, Introduction to Internet, Internet Services, Types of Internet Connections, Internet Security
V	Introduction to Emerging Computer Technologies, Distributed Networking, Peer-to-Peer Computing, Grid Computing, Cloud Computing, Utility Computing, On-demand Computing Wireless Network, Bluetooth

Suggested Readings

- Fundamentals of Computers – Reema Thareja, Oxford Publications

Unit	BCA114: Mathematics I
I	Sets:-definition of sets, Representation of sets, Type of sets i.e. empty set, equal set, finite and infinite set, subset, power set, universal set, operations on sets, intersection of sets, properties of operation on sets, complement of a set, properties of complement of set. Relations:- Definition of relation, Types of relations Functions:- Definition of function Types of functions, Cartesian product of sets, Binary operations.
II	Matrix:- Definition of matrix, Types of matrixes i.e. Row matrix, column matrix, equal matrix, square matrix, Diagonal matrix, Scalar matrix etc., operation on matrixes i.e. addition, subtraction and product of matrixes. Determinant:- Definition of determinants, expansion of determinants, operation on determinants, minors, cofactor, singular and non-singular matrix, Ad joint of matrix, Inverse of a matrix.
III	Quadratic equations:-Definition of quadratic equation, solution of quadratic equation by factorization method and shridharacharya's formula, relation between the roots of a quadratic equation, Formation of quadratic equation from given roots. Sequence & series: Introduction, Arithmetic progression (AP), General term of a AP , sum of n terms of a AP, Arithmetic mean, Geometric progression (GP), general term of G.P., Sum of a G.P., Geometrical mean.
IV	Trigonometry:- Angles, Degree measures, radian measures, Relation between radian and real number, Relation between degree and radian, trigonometric functions and identities, sign of trigonometric functions, sum and Difference of two angles of trigonometric functions.
V	Coordinate Geometry: The number plane, distance formula, area of a triangle, section formula, slope of a line, equation of a straight line: introduction, point form, slope form, two

	point form, intercept form, normal form, distance of a point from a line, distance between two parallel lines, angle between two lines.

Suggested readings

- Matrices and Determinants; Kapoor & Gupta
- NCERT mathematics book

Unit	BCA115: Communicative skills
I	Comprehension: Comprehension includes understanding the language by reading and writing. Passages will be given to read and question will be asked to evaluate the level of comprehension.
II	Text: Remedial Course in English Book II Short questions based on the passage from the text will be given.
III	Functional Grammar: Grammar will be taught in a functional, integrated and informal way, laying stress more on the usage rather than defining them Modal verbs (Can, could, may, might, shall / will, should, must would, ought to, need and dare) Tenses : Simple Present, Progressive, Present Perfect and perfect continuous, Simple past, progressive, past perfect and perfect continuous. Indication of Futurity, future continuous and future perfect. Active and Passive Voice (Simple present & Past, Present & Past perfect and to infinitive structure) Antonyms , synonyms, prefix and suffix
IV	Writing Skills Letter Writing :- (Formal and Informal), Various types of business and social letters and Applications Report Writing:- (Newspaper Report and Factual Reports)
V	Paragraph Writing (Descriptive and Factual) Précis Writing

BCA121: C LANGUAGE LAB
Practical Exercises
Exercises based on data types, constants and variables, arithmetic operators, library functions, expressions, input/output statements, compound statements and blocks, relational, logical, bit wise, unary operators, Control statements, arrays - one-dimensional and multidimensional arrays, structures, Pointers – declaration, increment and decrement operation, pointer to array, array of pointers, pointers to structures, Functions - call by value, call by reference, calling functions with arrays, recursion, strings, file input/output statements, creating, reading, writing and modifying files

BCA122: COMMUNICATIVE ENGLISH LAB
Practical Exercises
Essentials of Grammar, Conversational Skills

BCA123: WEB DESIGN LAB	
SNo	**Practical Exercises**
1	Demonstrate the character formatting Tags like <B>, <I>, <U>, <STRIKE>, <SUB>, <SUP> and <KBD>
2	Create a page with a link at the top of it that when clicked will jump all the way to the bottom of the page. At the bottom of the page there should be a link to jump back to the top of the page.
3	Design a Web page which show's Special Character like (© , ®, >, @ etc) with the help

	of ASCII Codes.(Start from 34 to 132).
4	Demonstrate how to make a navigation frame. This navigation frame contains a list of links with the second frame as the target.

BCA - II Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA211	Mathematics II	3	3 hrs	20	80	100
BCA212	Data Structure	3	3 hrs	20	80	100
BCA213	Object oriented programming with C++	3	3 hrs	20	80	100
BCA214	Communicative English	3	3 hrs	20	80	100
BCA215	Principles of Management	3	3 hrs	20	80	100
BCA231	Environmental Science	3	3 hrs	20	80	100
BCA221	C++ Lab	4	3 hrs	20	80	100
BCA222	Communicative English Lab	4	3 hrs	20	80	100
BCA223	Data Structure Lab	4	3 hrs	20	80	100
	TOTAL					800

Unit	BCA211: Mathematics II
I	Limits:-Definition of limit of a Function, Right hand limit(RHL), Left hand limit(LHL), evaluation of limits of a function by method of factors, method of substitution. Continuity:- Definition of continuity, continuity of function at a point Differentiability: differentiability of function at a point.
II	Standard formulae of derivatives, differentiation of product and quotient of two functions, Differentiation of a function of a function, logarithmic differentiation, differentiation of implicit and parametric functions.
III	Maclaurins theorem, expansion of some standard functions i.e. e^x, sinx, cosx etc., Taylor's theorem and simple problems, Maxima and minima of functions of one variables and simple problems based on it.
IV	Integrations : Integration by standard formula, Integration by substitution, integration by parts.
V	Definite integral : Evaluation of definite integrals, properties of definite integrals and simple problems based on it.

Suggested Readings

- NCERT Mathematics book

Unit	BCA212: Data Structure
I	Elementary data structure: Data types, Arrays and their representation, records and record structures. Linked lists: Representation of linked list in memory, insertion, deletion and searching of linked list, circular linked list, doubly linked list,
II	Stacks: Definition, array and linked implementation, operations on stack, application of stack, arithmetic expressions and recursion, prefix and postfix notations, evaluation of polish notation using stack. Queues: Queue data structure, implementation, operation on queues, operations on circular queue, priority queues.
III	Trees: Concept and terminology, Binary trees, linear and linked representation of binary trees, binary search tree, insertion and deletion operations on a binary search tree, Tree traversal techniques- In order, Preorder, Post order traversal and their recursive algorithms.
IV	Graphs and their representations, adjacency matrix, path matrix, graph traversal, breadth first search and depth first search algorithms.
V	Sorting and Searching: Sequential, Binary Search, Internal and external sorting techniques, Bubble sort, Insertion sort, Selection sort, Merge sort and quick sort algorithms.

Suggested Readings

- Schaum's outline Data structure.
- E.Horowiz and S.Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
- R.S.Salaria, " Data Structures & Algorithms" , Khanna Book Pblishing Co. (P) Ltd..,2002

BCA213: Object Oriented Programming with C++

Unit	
I	Principles of Object -Oriented Programming:-Object-Oriented Programming Paradigm, Basic concepts of Object-Oriented programming, Benefits of OOPS, Object-Oriented Language, Application of OOPS, Application of C++, Simple C++ Program, Structure of C++ program, Creating Source file. Compiling and linking, Tokens, Keywords, Identifiers, constants, Basic data types, User-defined data types, derived data type, Symbolic constants, Type compatibility, Declaration of Variables, Dynamic initialization of variable, Reference variable, Operator in C++, Scope resolution operator, Member dereferencing operator, Memory management operator, manipulator, Type cast operator.
II	Expressions and their type, Special assignment expression, implicit conversion, operator overloading, Operator precedence, control structure Function in C++:- Function prototype, call by reference, Return by reference, Inline function, Default arguments, const Argument, Function overloading, Classes and Object:- Specifying a class, Defining member function, C++ program with class, Making an outside function inline, Nesting of member functions, access modifier, array with in class, memory allocation for object, static data member, static member function, Array of objects, Objects as function argument, Friend function, Friend class, Returning objects, const member function, pointer to member.
III	Constructors:- Constructors, parameterize constructor, Multiple constructor in a class, constructors with default argument, Dynamic initialization of object, copy constructor, dynamic constructor, constructing two dimensional array, const object, Destructors, Operator Overloading:- Operator overloading, overloading unary operators, overloading binary operators, overloading binary operators using friend, Manipulation of string using operator, Rules for overloading operators , type conversion.
IV	Inheritance: - Defining derived classes, Single inheritance, Private member inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Virtual base classes, Abstract classes, Constructor in derived classes, Member classes: Nesting of classes, Template, generic function, generic classes.
V	Working with file:- Classes for file stream operations, opening and closing a file, Detecting End-of file, Open(): file mode, File pointer and their manipulation, Sequential input and output operation.

Suggested Readings

- Object- Oriented Programming with C++ by E Balagurusamy, Tata McGraw hill

Unit	**BCA214: Communicative English**
I	Unseen Passage for analysis (Question answers, vocabulary, one word, sentence formation, synonyms and Antonyms)
II	Subject verb concord : (Rules regarding the concord will be discussed and Exercises will be given) Reported Speech : (Declarative sentences, Imperatives, Interrogatives – wh- questions yes / no questions, exclamation sentences) Non Finite verbs : (Gerunds, infinitives and participles)
III	Idioms, Common Errors (Involving the use of Articles, Prepositions and Tenses) One word substitution.
IV	Writing skills: Formal Letters Various types of Business letters related to Job Application and Resume Writing Report writing, Project Report
V	Essay writing and short composition.

Unit	**BCA215: Principles of Management**
I	Introduction to Management- Meaning & Definition, Nature, Scope and Functions of Management, Roles and Responsibilities of a Manager, System and Contingency Approach for understanding organizations,
II	Planning – Concept, Nature, Importance, Advantages & Limitations, Essentials of

	Planning, Types of planning. Objectives- Definition, Characteristics, Essentials of Objectives, Management by Objectives (MBO).
III	Fundamentals of Organizing- Meaning and definition -Nature and purpose, Types of Organizations: line, staff and matrix. Delegation of Authority- Centralization & Decentralization, Span of Management.
IV	Decision Making- Concept, Process, Types, Direction & Co-ordination- definition and Meaning - Importance, Management by Exception.
V	Controlling: Concept and Process, Control Techniques, Control as a Feedback System and Feed Forward Control. Span of control.

Suggested Readings

- Management & Organization- Louis A. Allen, McGraw Hill, publications
- Management: A Global Perspective, Koontz & Weirich, McGraw Hill publications
- Management- Koontz & O' Donnel, Tata McGraw Hill publications

Unit	BCA231: Environmental Science
I	The multidisciplinary Nature of Environment Studies – Definition, Scope & Importance, Need for public awareness, Natural Resources & Its conservation – Energy resources – Growing energy needs renewable & Nonrenewable energy Resources, Use of alternative energy resources – solar and wind energy, Forest Resources – Use & over-exploitation, deforestation & their effects on forest & tribal people, Land resources – Land as resource, land degradation, soil Erosion & Desertification.
II	Natural resources and its conservation- Water resources : Use and over utilization of surface and ground water, Floods, Drought, Conflicts over water, Mineral resources : Use and exploitation, Effect of extracting and using mineral resources on environment, Food resources: World food problem, Strategies of modern agriculture to increase food production, Effect of fertilizers and chemical pesticides on food.
III	Concept of an ecosystem, Structure of an ecosystem, Energy flow in the ecosystem, Food chains, food web and ecological pyramid, Brief idea about terrestrial ecosystem and aquatic ecosystem
IV	Biodiversity & Its conservation - Introduction – Definition : genetic, species & ecosystem, Diversity - Value of Biodiversity, Biodiversity at global, national & local levels, Threats to Biodiversity - habitat loss, poaching of wildlife, Important Endangered species of India
V	Environmental pollution –Causes, effect and control measures: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management, Socio-Legal Issues related to Environment Protection, Role of NGO's and individual in prevention of pollution, Environmental protection Act

BCA221: C++ LAB
Practical Exercises
Exercises based on Class, Namespace, Function, Operator Overloading, Binary Operator Overloading, Constructor, Copy Constructor, Exception Handling Divide by zero, Multiple Catch, Friend Function, Function Overloading, Function Template, Inline Function, Multiple Inheritance, File Operation – read, write, Inheritance, Static Data and Member Function, Unary Operator Overloading, Virtual Base Class, Virtual Functions

BCA222: OFFICE AUTOMATION LAB
Practical Exercises
Exercises based on Creating and Formatting a simple document (using bulleted and Numbered list, adding Headers, Footers and Page numbers, Tables (create tables, editing tables, formatting tables, converting), Mail Merge.
Exercises based on Formatting the worksheets(Formatting the cell, rows and columns), Working with functions and formulae, Presenting Data with Charts

Exercises based on Presentation using Text, animation, images, media, Creating a graph in a PowerPoint slides, Creating self running presentations

BCA223:DATA STRUCTURE LAB
Practical Exercises
Exercises based on Linear array and Multidimensional array, Linked list: insertion, deletion ,searching a item, Stack implementation using Array, Stack implementation using Linked lists, Queue implementation, Tree traversal, Searching : Linear, Binary, Sorting: Bubble, Insertion, Selection

BCA - III Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA311	Java Programming	3	3 hrs	20	80	100
BCA312	Computer Networks	3	3 hrs	20	80	100
BCA313	Database System	3	3 hrs	20	80	100
BCA314	E-commerce and Cyber Law	3	3 hrs	20	80	100
BCA315	Digital Electronics	3	3 hrs	20	80	100
BCA321	Java Programming Lab	4	3 hrs	20	80	100
BCA322	Database Lab	4	3 hrs	20	80	100
BCA323	Digital Electronics Lab	4	3 hrs	20	80	100
	TOTAL					800

Unit	BCA311: JAVA Programming
I	Object Oriented Concepts in Java, Comparison of Java and C++, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic. Java Source File Structure, Compilation, Execution
II	Class Fundamentals, Object & Object reference, Creating and Operating Objects, Use of Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data Types, Operators-precedence and associativity, Type conversion, Command line argument, accepting input from keyboard, decision making – if, if..Else, switch; loops – for, while, do…while; special statements–return, break, continue.
III	Array – single and two dimension array. Object Life time & Garbage Collection, Access Modifiers, Constructors , Object Life time & Garbage Collection, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Finalize() Method, Use of this keyword
IV	Inheritance – Advantages of Inheritance in OOP, types of Inheritance, constructors in inheritance, use of super keyword, polymorphism; Interfaces - defining an interface, implementing and applying interfaces, using variables in interfaces, extending interfaces; Method overriding – use, need, advantage. Use of super, final and static keyword
V	Package - Organizing Classes and Interfaces in Packages, Package as Access Protection, defining Package, CLASSPATH Setting for Packages and Naming Convention for packages. Applets, Applet security restrictions, the class hierarchy for applets, Life cycle of applet, HTML Tags for applet. Difference between application and applet. Exception Handling: try..catch..throw..throws...finally, Throwing your known exception

Suggested Readings

- Programming with Java IV Edition – E Balagurusamy IV Edition

Unit	BCA312: Computer Networks
I	Principles of Data Communication: Evolution of computer networks, General features and tasks of a communication system, need for modulation. Fundamentals of signals, carrier waves, general principles of amplitude modulation, frequency modulation and phase modulation, elements of LAN, WAN, MAN . Introduction to serial communication.
II	Networking Architecture: ISO-OSI, IBM SNA architecture –their functions of each layer and implementation. Concepts of circuit switching, packet switching and message switching. Fundamentals of datagrams. Flow and Error Control – Stop and Wait, Sliding Window, Automatic Repeat Request
III	Data communication concepts: Connecting devices, hub, switch, bridge, routers and gateways, Signal encoding and decoding techniques - Amplitude Modulation, Frequency Modulation, Phase Modulation, signal bandwidth requirements, signal formats used in LAN, network protocols: LAN cabling standards, IEEE LAN standards, Introduction to

	Ethernet (IEEE 802.3)
IV	Error detection and correction codes: Parity bit, Checksum, Hamming codes, CRC, single error detection and correction. Introduction to Network security Model, concepts of key, ceaser cipher, transposition cipher, DES.
V	Transmission media- twisted pair, coaxial cable, optical-fibre. LAN topologies: STAR, BUS and RING network, LAN access techniques: ALOHA, CSMA, token ring and token bus. Issues related with network reliability and fault redundant network systems.

Suggested Readings

- Stalling, Data & Computer Communication
- Tanenbaum, Computer Network, Pearson.Ed., Pearson
- Kurose, Computer Networking, Pearson
- Peterson, Davie; Computer Networks, Elsevier

Unit	BCA313: Database System
I	Introduction to Database: Need for DBMS, advantages of DBMS, views of data, instances and schema data independence, database administrator, database manager, database languages, overall structure of DBMS.
II	Entity Relationship Model: Entities, attributes, relationship, constraints, keys, E-R diagram. Concept of strong and weak entity sets, generalization, specialization and aggregation.
III	Relational Model: Structure of Relational Databases, Relational Databases, Modification of the Databases, Tuple Relational Calculus, Domain Relational Calculus.
IV	SQL – Basic structure – Clauses, data types, creating tables. Modification of the database – deletion, insertion, updates. Retrieving data from tables, ordering, set operations – union, intersect, except, concept of NULL values, nested subqueries – set membership, set comparison, exist and not exist operator, unique, not unique construct.
V	Joins, equi-joins, non-equi-joins, self joins, outer joins. Aggregate functions – group by and having clause. Math functions, string functions, group by clause. Indexes, views, granting and revoking permissions.

Suggested Readings

- Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill
- Fundamentals of Database Systems, Elmasri, Navathe, Addision Wesley

Unit	BCA314: E-Commerce and Cyber Law
I	Electronic Commerce, Scope of the Internet and Web, Using the web to reach the customer, Benefits of E-Commerce markets, Type of E-Commerce Technology, Types of E-Business Models and Markets, Types of E-Commerce Providers and Vendors
II	E-Commerce Website Creation, Managing E-Commerce Website Development- Website Server, Developing Commerce Site, Requirement for Site, Building the Site, Implementation of Site, Building Shopping Cart Application, Mobile E-Commerce, Enhancing a Web Server with E-Commerce Application Development.
III	Implementing and Managing E-Commerce Site- Strategies, Techniques and Tools, Implementing merchandising strategies, E-Commerce Databases, Applying and Managing E-Business Intelligence Tools for application development, Types of Security Techniques, Building E-Commerce Trust Infrastructure.
IV	E-Payments Technology- Payment Technologies Issues, E-payment through Smart Cards, E-payment system, Digital Currencies, International E-Commerce Solutions- Auction resources, Smart Cards, Digital Wallets, Person to Person payments, Micropayment System (eCash), Token value and store based credits.
V	Introduction to IT and Cyber laws , Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property rights , Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, Cyber Crime Investigation and Cyber Security etc. , E-Mail Tracking, IP Tracking, E-Mail Recovery.

Reference Books:

- Electronic Commerce : Pete loshin, John Vacca.

Unit	BCA315: Digital Electronics
I	Number Systems and Codes: Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexa-Decimal Number System, Inter-conversion methods. Binary Arithmetic: addition and subtraction, Binary Codes: Weighted and Non-Weighted Codes, 8421 BCD Code, Excess-3 Code, Gray Code, ASCII and EBCDIC.
II	Boolean Algebra: Introduction to Logic. Logic Operations, AND, OR, NOT. Principle of Duality, AND Law, OR Law, Law of Negation, Commutative Law, Associative Law, Distributive Law, De-Morgan's Theorem. Digital Circuits: Introduction to Combinational and Sequential Circuits, Classification of Gates: Basic Gates, Universal Gates, And Exclusive Gates. Minterms and Maxterms, Sum of Products (SOP) and Products of Sum (POS). Reduction Techniques: Need of Reduction. Reduction by Boolean Algebra, Karnaugh Maps: 2,3,4 Variable.
III	Combinational Circuits: Arithmetic Circuits: Half-Adder, Half-Subtractor, Full Adder, Full Subtractor, Parallel Adder, 2's Compliment Adder-Subtractor. Multiplexers, De-Multiplexers, Decoders, Encoders, Magnitude Comparator.
IV	Sequential Circuits: Flip-Flops: RS, D using NAND and NOR Gates, Introduction to Clock, & Timing Diagrams. Gated Flip-Flops (Latches). J-K Flip-Flop, T-Flip-Flop, J-K Master Slave Flip-Flop. Registers: Buffer register, shift register, SISO, SIPO, PISO, PIPO registers.
V	Sequential Circuits: Counters: Asynchronous and Synchronous; Ripple Up, Ripple Down Counters, Modulo Counters. Design of Synchronous Counters. Memories: Classification of memories, Volatile and Non-Volatile memories. Memory Technologies; Semiconductor, Magnetic and Optical Memories. RAM and ROM.

Suggested Readings:

- Fundamentals of Digital Circuits, Kumar Anand. A., PHI New Delhi
- Modern Digital Electronics, Jain R. P., Tata Mc Graw Hill , New Delhi
- Digital Design, Mano Morris, M. , PHI, New Delhi
- Digital Computer Fundamentals, Bartee Thomas, C., Mc Graw Hill.

BCA321: JAVA LAB
Practical Exercises
Exercises based on Input/output statements, loops, if, switch, array(1d-2d), constructors, Method Overloading, static and this and final keywords, String and its inbuilt functions, inbuilt mathematical functions, Method Overriding, Abstract Class, Runtime polymorphism, Exception Handling (User defined also), finally block, package, applet.

BCA322: DATABASE SYSTEM LAB
Practical Exercises
Exercises based on creating table, inserting data into tables, viewing data in the tables, sorting data in table, deleting tuples from table, updating the contents of a table, modifying the structure of table, applying primary key, foreign key and unique key constraints, computations on table data, oracle functions, grouping data from tables, subqueries, Joins
BCA323: DIGITAL ELECTRONICS LAB
Practical Exercises
Exercises based on Logic Gates:Verification of AND,OR,NOT,Universal Gates,Exclusive gates with 2 and more inputs, truh tables, NAND GATE as universal gate, Designing of logic circuits from equations. Boolean laws and postulates,demorgan's Theorem, Adder: Half adder, Full adder; Subtractor: Half , full subtractor; Encoder, Decoder, Multiplexer, Demultiplexer, 2-2 bit comparator, Sequential Circuits: RS latch,RS Flip flop,D latch,D flip Flop,J K Flip Flop, J K master slave flip flop with characteristic tables ad block, circuit diagrams;Registers:Buffer,Shift

register, Counters: Asynchronous and Synchronous; Ripple Up, Ripple Down Counters, Modulo Counters.

BCA - IV Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA411	VB.NET	3	3 hrs	20	80	100
BCA412	Computer Oriented Numerical & Statistical Methods	3	3 hrs	20	80	100
BCA413	Operating System	3	3 hrs	20	80	100
BCA414	Computer Graphics	3	3 hrs	20	80	100
BCA415	Computer Architecture	3	3 hrs	20	80	100
BCA421	VB.NET Lab	4	3 hrs	20	80	100
BCA422	Computer Graphics Lab	4	3 hrs	20	80	100
BCA423	Computer Architecture Lab	4	3 hrs	20	80	100
	TOTAL					800

BCA411: VB.NET	
Unit	
I	DOT NET Framework, Overview and Base Class Library, MSIL, Common Language Run Time (CLR), Events, .NET Assemblies, Shared Assemblies, Advantages of Assemblies over Predecessors, Dynamic Link Library (DLL), Namespaces, Visual Studio IDE
II	Variables, Data types, Operators, Control Structures: if-then-else, Select Case, for-next, for Each….Next, Do loop, While…End While, Type Conversions, Functions, Subroutines, , Error Handling and Debugging
III	Array: One dimensional, two dimensional, variable size arrays, System. Array class, Array list class, Building Windows Application: button, checkbox, checkedlistbox, colordialog, combobox, datetimepicker, label, listbox, listview, picturebox, progressbar.
IV	Controls: Radiobutton, textbox, masked text box, rich text box, numeric up-down, treeview, tooltip, timer, Tab control, panel, group box, menu strip, status strip, tool strip, openfiledialog, savefiledialog, folderbrowserdialog.
V	Basic Idea of ADO.NET, OleDbConnection, OleDbCommand, OleDbDataReader, OleDbDataAdapter, Dataset, Datatable, Datarow, Datacolumn. Using Data controls: Datagridview, binding source, binding navigator.

Suggested Readings

- The Visual Basic. NET Bible by Bill Evjen, Jason Beres and et al. ISBN: 0764548263
- ASP.NET Bible by mridulaParihar and et al. ISBN: 0764548166

Unit	**BCA412: Computer Oriented Numerical and Statistical Method**
I	Significant digits, floating point representation of numerals, arithmetic operations with normalized floating point number–addition, subtraction, multiplication and division, errors in numerical computation. Pitfalls in computing.
II	Initial approximation of roots, Descate's rule of sign, Iterative Methods - Bisection, Regula-Falsi, Newton Raphson, method of successive approximations, Concepts of roots synthetic division , value and values of derivative of a polynomial by synthetic division.
III	Solution of ordinary differential equations - Taylor's method, Euler's method, RungeKutta second and fourth order method, Picard's method, modified Euler's method. Numerical Integration - Introduction, Trapezoidal rule, Simpson's 1/3 and 3/8 rule.
IV	Solution of simultaneous linear equation: Gauss elimination method, Pivoting, ill conditioned equations, Refinement of solution, Gauss Seidal iterative method. Curve fitting - Method of

	least squares, fitting of straight lines, polynomials, exponential curves.
V	The basic concepts: Variables and Attributes, Statistics, Population and sample, complete enumeration vs sample surveys, probability and purposive sampling, simple random sampling Frequency distributions: Frequency distributions, histograms, Frequency polygons, frequency curves, cumulative frequency, distributions, ogives, Measure of Central Tendency, Median, mode, arithmetic mean

Suggested Readings

- Computer Oriented Numerical Methods, R S Salaria, Khanna Publication
- Computer Oriented Numerical Methods, P Thangaraj, PHI Publication
- Computer Oriented Numerical Methods, V Rajaraman, Prentice Hall India

Unit	**BCA413: Operating System**
I	Introduction: Definition of Operating System, Types of operating systems: Batch Systems, Multi programming, Multiuser, Multitasking, Time–sharing, Spooling, Parallel, Distributed and Real-time systems, Operating System Concepts, Operating System Services, System calls**.**
II	Process Management: Process concept, Process States, Representation of process (PCB), Process Scheduling, CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Algorithm evaluation.
III	Memory Management: Contiguous, Non contiguous, Swapping, Fragmentation, Compaction, Paging, Segmentation, Virtual memory management, Demand paging, Page replacement and Virtual memory concepts, Introduction to Thrashing.
IV	The Deadlock problem, Characterization (Hold and wait, Circular Wait, No Pre-emption, No sharing of resources), Prevention, Avoidance: (RAG And Wait for Graph), Detection and Recovery from Deadlock: (Banking algorithm and detection algorithm), Concept of Fork and Join methods.
V	Process concurrency, Concept of concurrency, cooperating process, precedence graph, Critical section problem, Mutual exclusion , semaphores, classical process (Reader Writer problem, Consumer producer problem, Dining Philosopher problem),Inter Process Communication

Suggested Readings

- Operating System Concepts Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons Inc.

Unit	**BCA414: Computer Graphics**
I	Introduction: fundamentals of Computer Graphics, point, dot, pixel, Resolution, Elements of graphics workstation. Video Display Devices-Raster Scan Systems Random Scan systems. Input devices. Graphics Software Coordinate Representations, Fundamental Problems in Geometry, Concepts of video memory and frame buffer.
II	Algorithms: Line drawing algorithms- DDA Algorithm, Bresenham's Line Algorithm, Circle: Midpoint Circle Algorithm. Polygons, convex and convex polygons. Inside-Outside tests, Polygon fill algorithms: Boundary fill Algorithm, Flood fill Algorithm. Character generation. Attributes of lines, curves, characters. etc.
III	Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates, Display- File structure. Display – file algorithm. Display control and Polygon representation. Attributes of output primitives: Line attributes - Line type. Line width. Pen and Brush options. Line Color. Color and gray scale levels. Color-tables. Gray scale. Area-Fill Attributes- Fill styles. Pattern fill. Soft fill. Character Attributes. Text attributes.
IV	Geometric Transformations: Matrices. Translation, Scaling Transformations. Sine and Cos Rotation. Homogeneous Co-ordinates . Composite Transformation. Rotation and scaling about an arbitrary point. Inverse Transformations, Transformations Routines.
V	2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Window to viewports co-ordinate transformation, 2-D Viewing functions. Clipping operations point clipping, Cohen- Sutherland Line Clipping algorithm, Sutherland Hodgmann polygon clipping algorithm

Suggested Readings

- Computer Graphics Hearn & Baker
- Computer Graphics by Steven Herrington

Unit	BCA415: Computer Architecture
I	Register Transfer Language: Inter-register transfer; Parallel, Serial & Bus Transfer. Memory Transfer. Arithmetic, logic & shift micro-operations. Control Functions. Machine and Instruction cycles
II	I/O Architecture: I/O devices and their controllers: LED Display & Hex Keyboard. Peripheral Devices. I/O interface. Microprocessor Interface, Elementary concepts of Isolated IO and Memory mapped IO. Modes of Transfer: Asynchronous data transfer: strobe control, handshaking. DMA
III	CPU organization: Address, data & Control bus. Processor bus organization. ALU: Arithmetic and logic circuit. Stack organization. Instruction format and Addressing Modes.
IV	Microprogram control organization: control memory, Address sequencing: mapping of macro-operation, subroutines. Microprogram Example, microinstruction format. Microprogram sequencer.
V	Microprocessor system: Introduction to microcomputer system. Pins of 8085 microprocessor, Block diagram of 8085 microprocessor. Programming model of 8085. Assembly language structure of 8085.

Suggested Readings

- Computer System Architecture. Manno M. PHI
- Introduction to Microprocessors, Leventhal, L.A, Prentice Hall of India
- Introduction to Microprocessors, Mathur, A.P., Tata McGraw Hill

BCA421: VB.NET LAB
Practical Exercises
Exercises based on Events such as Click, Indexchangedetc, Controls like button,textbox,checkbox, etc, Control structures like for..next,while,do while etc, Arrays so as to accept the input and process the data

BCA422: COMPUTER GRAPHICS LAB
Practical Exercises
Exercises based on inbuilt graphic functions, line drawing algorithms, polygon fill algorithms, transformation(translation, scaling, rotation), simple animation

BCA423: COMPUTER ARCHITECTURE LAB
Practical Exercises
Exercises based on Data transfer group: Move, load, store, memory references, Arithmetic Group, Logical bit manipulation programs, Branch and subroutines, Stack and interrupts

BCA - V Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA511	ASP.NET	3	3 hrs	20	80	100
BCA512	Organization Behaviour	3	3 hrs	20	80	100
BCA513	LINUX Operating System	3	3 hrs	20	80	100
BCA514	Internet Programming	3	3 hrs	20	80	100
BCA515	System Analysis and Design	3	3 hrs	20	80	100
BCA521	ASP.NET Lab	4	3 hrs	20	80	100
BCA522	LINUX Lab	4	3 hrs	20	80	100
BCA523	Internet Programming Lab	4	3 hrs	20	80	100
	TOTAL					800

Unit	BCA511: ASP.NET
I	Anatomy of .NET, .NET Base Classes, Microsoft Intermediate Language, CLR, Client Server model, IIS Web Server, Namespaces, ASP.NET: How the ASP.NET works, Basics of ASP.NET, Creating and Deploying the ASP.NET applications, Concept of Code behind, Use of Web Applications using ASP.NET, Difference between Windows and Web Applications.ASP.NET directives.
II	ASP.NET:Web forms, Web Controls categories: server Controls and Web Controls:Label, Textbox, CheckBox and CheckBoxList, RadioButton and RadioButton List, ListBox and DropDownList, Table, Image ,Hyperlink, HiddenField, FileUpload. RichWeb Controls: AdRotator, Calendar, TreeView, TabStrip.Concept of Master Page and Navigation Controls.
III	Validation Controls: Need of Validation Control, Various Controls like Require Field, Compare, Range, RegularExpression, Custom, Validation Summary, Dynamic controls. Debugging ASP.NET pages: Error Handling: Custom Error Page, Using Debugging Tools: Debugger and Trace Facility.
IV	ASP.NET Database Programming, Introducing ADO.NET, ADO .NET Object Models, Communicating with OLEDB Data Sources Using ADO.NET, Working with Datagrids. Data binding with different controls. Data Command, Data Reader objects.
V	Web Services: Concept of web services, Infrastructure for Web services. ASP.NET Security: IIS security: Authentication, Authorization and Impersonation using Session State.ASP.NET Application Configuration, Web.Config, Global.asax file.

Suggested Readings

- ASP.NET Bible

BCA512:Organization Behaviour	
Unit	
I	Introduction to O.B- meaning, definitions, nature and scope of O.B, objectives , importance of O.B, contributory disciplines to OB.
II	Foundation of individual behaviour - Personality-Meaning, types, Perception- definition, Meaning, Factor influencing Perception, common perceptual errors, Process, Attitudes.
III	Motivation –Meaning, Definitions, Importance, early theories of motivation, Group dynamics
IV	Leadership – Meaning and definition, characteristics, styles and Importance. Work stress, Counselling- types and importance.
V	Organizational Change- Meaning, types, Importance, Process, Resistance to change, Overcoming resistance to change.

Suggested Readings

- Management & Organization- Louis A. Allen, McGraw Hill, publications
- Management & Organization- C.B. Gupta, Sultan Chand Publications
- Management: A Global Perspective, Koontz & Weirich, McGraw Hill publications
- Management- Koontz & O' Donnel, Tata McGraw Hill publications

- Essentials of Management- Massie, Prentice Hall publications

BCA513: LINUX Operating System	
Unit	
I	Introduction to the Concept of Open Source Software, Linux Overview, History of Linux, Linux distributions, architecture, Linux file system (inode, Super block, Mounting and Unmounting) , Kernel , Introduction to Linux Processes and System calls .
II	Introduction to Shell, Various shells, shell customization, vi editor, Linux files and the file structure, listing, displaying and printing files, managing directories, File and Directory operations, Essential Linux commands, Internal and External commands, Archiving and compressing files.
III	I/O redirection and Piping, Simple filters commands – grep, head, tail, cut, paste, sort, uniq. Processes: background process, premature termination of process, process priorities, process scheduling, nohup command. Compiling C Programs in Linux Environment
IV	Shell programming: Interactive scripts. Shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command. sleep and wait, script termination, Taking decisions, Loop Control Structure, Shell Metacharacters,Shell Miscellany
V	File Ownerships and access permissions, changing permissions and ownerships, User and its Home directory, Booting and Shutting down, Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services,init and run levels

Suggested Readings

- Linux: The Complete Reference, Richard Petersen
- Design of the UNIX Operating System Maurice J. Bach, AT&T Bell Labs.
- Unix shell programming, Yashwant Kanetkar, BPB Publications.

Unit	BCA514: Internet Programming
I	Creating Forms, The <FORM> tag, Named Input fields, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data.
II	Concepts of Scripting language, use of client site script for validation. JavaScript: Introduction, Client-Side JavaScript, JavaScript Objects. Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? : (Conditional operator). Statements: break, comment, continue, delete, do-while, for, for-in, if-else, labelled, return, switch, while.
III	Properties and Methods of Each: Array, Boolean, Date, Function, Math, Number, Object, String, regExp Document and its associated objects : document, Link, Area, Anchor, Image, Applet, Layer Events and Event Handlers : General Information about Events, Defining Event, Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload.
IV	Understanding the CSS Box Formatting Model, Element Padding, Element Borders, Border Width, Border Style, Border Color, Border Spacing, Element Margins, Dynamic Outlines. Understanding Positioning Methods, Static Positioning, Relative Positioning, Absolute Positioning, Fixed Positioning, Specifying an Element's Position, Floating Elements, Controlling an Element's Size, Specifying an Exact Size, Specifying a Minimum or Maximum Size, Controlling Overflow, Element Layers, Controlling Visibility.
V	Server site web technologies, Concept of web server and its various protocols. Different structure available for web technologies: IIS, Apache. Introduction to server site scripting language PHP on WAMP architecture. Getting and processing data from HTML page. Database Connecting with MySql Database.

Suggested Readings

- Web Standards Programmer's Reference: Steven M. Schafer

BCA515: System Design and Analysis	
Unit	
I	System Concept: Definition, Characteristics of a System: Organization, Interaction, Interdependence, Integration, Central Objective. Elements of a System: Outputs and Inputs, Processor(S), Control, Feedback, Environment, Boundaries and Interfaces. Types of Systems: Physical or Abstract Systems, Open and Close Systems, Man-Made Information Systems.
II	System Development Life Cycle, Considerations for Candidate System: Technical Factors, Behavioral Factors, Political Considerations, Economic Factors. Planning and Control for System Success, Prototyping, Role of System Analyst.
III	Information Gathering: Various Methods, Tools of Structured Analysis: Data-flow Diagram, Decision Tree, Structured English, Decision Tables, Data Dictionary, Feasibility Study.
IV	System Design: Definition, Types of System Design: Logical and Physical Design. Design Methodologies: Structured Design, Form-Driven Methodology-IPO Charts, Structured Walkthrough. File Organization: Sequential Organization Indexed Sequential Organization, Inverted List Organization. Logical and Physical views of Data. Input Output form Design.
V	System Implementation: Need of Testing, Test Plan, Quality Assurance, Trends in Testing, Audit Trails, Post Implementation Review. Security and Recovery in System Development: System Security, Threats to System Security, Control Measures, Disaster/Recovery Plannings: Ethics in System Development.

Suggested Readings

- System Analysis and Design, Elias M Awad

BCA521: ASP.NET LAB
Practical Exercises
Exercises based on Serverside web form controls: label, textbox, button, radiobutton, checkbox, dropdownlist, listbox with their events, Client side validation controls: required filed, range, compare, regular expression, custom , validation summary, Database handling with MS-Access. Insert, update, delete and select operation, Login and logout implementation using session

BCA522: LINUX LAB	
SNo	**Practical Exercises**
1	Assignment based on installation of Linux Operating System.
2	Assignment based on vi editor, Linux files and the file structure, listing, displaying and printing files, managing directories, File and Directory operations, Essential Linux commands, Internal and External commands, Archiving and compressing files.
3	Assignment based on Compiling and Executing C Programs in Linux Environment.
4	Assignment based on Shell programming, shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command, sleep and wait, script termination, Taking decisions, Loop Control Structure, Shell Metacharacters.
5	Assignment based on File Ownerships and access permissions, changing permissions and ownerships, User and its Home directory, Booting and Shutting down, Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services, init and run levels.

BCA523: INTERNET PROGRAMMING
Practical Exercises
Exercises based on each html control like Text, Password, Checkbox, Radio, Combobox, Listbox, Textarea, Button, Submit and Reset, Exercises of JavaScript with functions, control statements in JavaScript, Implicit Objects in Java Script, different event handling of controls, CSS formatting and positioning, introductory server side PHP Script.

BCA - VI Semester						
Code	Description	Pd/ w	Exam	CIA	ESE	TOTAL
BCA611	Software Engineering	3	3 hrs	20	80	100
BCA612	Information System Management	3	3 hrs	20	80	100
BCA621	Colloquium Lab	4	3 hrs	20	80	100
BCA622	Major Project	4	3 hrs	40	160	200
	TOTAL					500

Unit	BCA611: Software Engineering
I	Software Engineering: Definition and paradigms, A generic view of software engineering.
II	Requirements Analysis: Statement of system scope, isolation of top level processes and entitles and their allocation to physical elements, refinement and review. Analyzing a problem, creating a software specification document, review for correctness, consistency, and completeness.
III	Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document: Review of conformance to software requirements and quality.
IV	Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document: Review of conformance to software requirements and quality.
V	Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance, case tools, Configuration Management.

Suggested Readings

- I.Sommerville, "Software Engineering", Addison Wesley,

BCA612: Information System Management	
Unit	
I	Overview of a Management Information System. Computers and information processor, Data, Information Systems, Information Resource Management and Decision Making, MIS structure, Structure base on management activity and organizational functions.
II	Various phases in the decision making process. Behavioral model of Decision Making and organization decision making. Decision under Psychological Stress.
III	Documentation and communication decision rules. Relevance of decision making. Age of information and application of information. Type of systems. Preventing systems entropy. System stress and system change.
IV	Concepts of organizational planning, Computational support for planning. Nature of control in organization. Information system support for control. The basic model of organizational structure. Information processing model of organization structure.
V	Introduction to Decision support system (DSS), Introduction to Expert system (ES), Support for Decision Making phases.

Suggested Readings

- Management Information System Gordon B.Davis, Margrethe H. Olson, Tata McGraw-Hill Publishing

BCA621: Colloquium Lab
Group discussion on various topics, To provide us with an avenue to train ourselves in various interpersonal skills.
BCA622: Major Project
Software project shall be developed by the students. There shall be 3 – 4 students in one project group who will work together as a team. In extreme cases it may be 5 students with prior permission. They will work under the supervision of one of the faculty of the department. The tools which can be used to develop the project shall only be the ones which they have studied in their course.