# YEARLY SCHEME OF EXAMINATION

## BCA COURSE

### (I-Year)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Paper Code</th>
<th>Name of Papers</th>
<th>M.M.(T./S./P.)</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>BCA-101</td>
<td>Introduction To Information Technology</td>
<td>70+30</td>
</tr>
<tr>
<td>2.</td>
<td>BCA-102</td>
<td>Pc Software Packages</td>
<td>70+30</td>
</tr>
<tr>
<td>3.</td>
<td>BCA-103</td>
<td>Problem Solving Through ‘C’ Programming</td>
<td>70+30</td>
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<tr>
<td>4.</td>
<td>BCA-104</td>
<td>Basic Electronics</td>
<td>70+30</td>
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<td>5.</td>
<td>BCA-105</td>
<td>Basic Mathematics</td>
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<tr>
<td>6.</td>
<td>BCA-106</td>
<td>Computer Organization</td>
<td>70+30</td>
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<tr>
<td>7.</td>
<td>BCA-107</td>
<td>Practical I : PC Software And Basic Electronics Lab.</td>
<td>100</td>
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<tr>
<td>8.</td>
<td>BCA-108</td>
<td>Practical II : C Programming Lab.</td>
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<td>1.</td>
<td>BCA-201</td>
<td>Computer Communications And Networking</td>
<td>70+30</td>
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<tr>
<td>2.</td>
<td>BCA-202</td>
<td>Database Management Systems</td>
<td>70+30</td>
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<td>3.</td>
<td>BCA-203</td>
<td>Fundamentals Of Operating Systems</td>
<td>70+30</td>
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<td>4.</td>
<td>BCA-204</td>
<td>Data Structures Using ‘C’</td>
<td>70+30</td>
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<td>5.</td>
<td>BCA-205</td>
<td>System Analysis And Design</td>
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<td>6.</td>
<td>BCA-206</td>
<td>Business Communications</td>
<td>70+30</td>
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<tr>
<td>7.</td>
<td>BCA-207</td>
<td>Practical I: Database Management &amp; Data Structure Lab.</td>
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<td>8.</td>
<td>BCA-208</td>
<td>Practical II: Business Communications Lab</td>
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<tr>
<td>1.</td>
<td>BCA-301</td>
<td>Object Oriented Programming Using C++</td>
<td>70+30</td>
</tr>
<tr>
<td>2.</td>
<td>BCA-302</td>
<td>Visual Application Development Using VB.Net 2010</td>
<td>70+30</td>
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<tr>
<td>3.</td>
<td>BCA-303</td>
<td>Linux Environment</td>
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<td>4.</td>
<td>BCA-304</td>
<td>Management Information System</td>
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<td>5.</td>
<td>BCA-305</td>
<td>Object Technology</td>
<td>70+30</td>
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<tr>
<td>6.</td>
<td>BCA-306</td>
<td>Digital Design</td>
<td>70+30</td>
</tr>
<tr>
<td>7.</td>
<td>BCA-308</td>
<td>Practical II : Linux.</td>
<td>100</td>
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Details of Syllabus
(I-Year)

BCA-101- INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT-I
Data Representation: Representation of Characters in computers, Representation of Integers, Representation of Fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes.
Input & Output Devices: Description of Computer Input Units, Other Input Methods, Computer Output Units (Printers, Plotters)

UNIT-II
Computer Memory: Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to Construct Memories, Magnetic Hard Disk, floppy Disk Drives, Compact Disk Read Only Memory, Magnetic Tape Drives.
Processor: Structure of Instructions, Description of a Processor, Machine Language and Instruction set. Processors used in desktops and lap tops. Specification of a desktop and Lap top computer currently available in the market (Specifications of processor, motherboard &chipset, memory, interface & capacity of hard disk & DVD drives, I/O ports)

UNIT-III
Computer Architecture: Interconnection of Units, Processor to Memory communication, I/O to Processor Communication, Interrupt Structures, Multiprogramming, Processor Features, Reduced Instruction, Set Computers (RISC), Virtual Memory.

UNIT-IV
Operating Systems: History and Evolution. Main functions of OS Multitasking, Multiprocessing, Time Sharing, Real Time OS with Examples
Database Management System: Purpose and Organization of Database, Introduction to Data Models

UNIT-V
Computers & Communications: Introduction to Computer Communications, Introduction to Computer Networks, Types of Networks, OSI/TCP Model, LAN technologies (fast Ethernet &Gigabit Ethernet), How LAN works, Brief survey of active and

**Suggested Readings:**
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.

### BCA-102- PC SOFTWARE PACKAGES

**UNIT-I**
**DOS**: Introduction, history & versions of DOS, DOS basics- Physical structure of disk, drive name, FAT, file & directory structure and naming rules, booting process, DOS system files, DOS commands- internal & external,

**UNIT-II**

**UNIT-III**

**UNIT-IV**
**Worksheet- MS-Excel**: Worksheet basics, creating worksheet, entering into worksheet, heading information, data, text, dates, alphanumeric values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Keyboard shortcuts, Working with single and multiple workbook, working with formulae & cell referencing, Auto sum, Coping formulae, Absolute & relative addressing, Worksheet with ranges, formatting of worksheet, Previewing & Printing worksheet, Graphs and charts, Database, Creating and Using macros, Multiple worksheets-concepts, creating and using.
UNIT-V

Introduction to Power Point: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering Art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

Other packages: DTP software: Brief survey of MS Publisher, Pagemaker, Coreldraw, Adobe Photoshop

Suggested Readings:
1. PC Software for Windows – R.K. Taxali
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.

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BCA-103- PROBLEM SOLVING THROUGH ‘C’ PROGRAMMING

UNIT-I

Algorithm & Algorithm Development: Definition and properties of algorithm, flow chart symbols, conversion of flow chart to language, example of simple algorithms, Introduction to program design, errors – syntax error, runtime error, logic error.

UNIT-II

Basics of C – Language: History, Constants – Integer, Real, Character; Variables and Keywords; Data types and size, constants, arrays, pointers, Operators – arithmetic, relational, logical, increment and decrement, bitwise and assignment, Hierarchy of Operators and Operations, Associatively of Operators, creation and evaluation of expressions.

UNIT-III

Control Structure: Decision Structure: - Simple if, if – else, if – else – if, nested if, switch case; Loop Control Structure: - while, do while and for; Use of break, goto and continue;

UNIT-IV

Functions: Function definition, declaration and prototypes, Call by Value and Call by Reference, Scope Rule of Functions.

UNIT-V

Complex C-Language: Variables – external, static, register; Recursive functions; multi – dimensional arrays; Pointers and arrays, pointer arrays, Structures – declaring and accessing elements, array of structure, File Input/Output – Create, Open, Read, Write, Delete, Close;

Suggested Readings:
1. Yashavant Kanetkar, Let us C
2. Balaguruswamy, Programming in C
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.
BCA-104- BASIC ELECTRONICS

1. **Semi Conductor Physics**: Properties of Semiconductors, Commonly used Semiconductors, Intrinsic & Extrinsic semi conductors, P Type & N Type semiconductors, PN Junction & Biasing..

2. **Semiconductor Diode**: Diode, symbol, ratings, forward & reverse bias characteristics. Half wave rectifier, full wave rectifier, bridge rectifier, and simple filter circuits Zener diode & its application

3. **Transistor (Introductory concepts)**: PNP & NPN Transistor, CB, CC, CE configurations & biasing, Transistor as an Amplifier, Transistor as a switch, Alpha & Beta parameters, Frequency response & bandwidth, RC coupled Trasistor Amplifier & Transformer coupled transistor amplifier – their circuit diagram, Audio power amplifier, Push Pull amplifier. Principle of negative feedback in Amplifier & Gain, Transistor tuned amplifier Circuit, Oscillate Circuits, Crystal Oscillator, Different type of signals: Sine Ware, Saw Tooth, Triangular, Pulses, Multi vibrators.

4. **LED, Photo Diode, Photo Transistor, Thermistor, LDR, BCR, Triode, their Characteristics & Applications.**

5. **FET, MOSFET & Construction, Symbol & Basic Circuits, their Advantage over Transistor.**

**Suggested Readings:**
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.

BCA-105- BASIC MATHEMATICS

**UNIT-I**

Evaluating **Algebraic Expressions**: Order of operations Evaluating algebraic expressions.


**Graphing Linear Equations**: Linear equations in two variables The Cartesian coordinate system the graph of a linear equation Slope Point-slope form of a line Graphing linear inequalities

**UNIT-II**

Systems of **Linear Equations**: Systems of equations in two variables (addition/elimination)
Operations with polynomials: Positive integer exponents, Zero and negative integer exponents, Definition of polynomials, Addition and subtraction of polynomials, multiplying polynomials

Factoring polynomials: Introduction to factoring, Difference of squares, Quadratic trinomials, Solving equations by factoring, some word problems involving quadratic, equations

UNIT-III
Radical expressions and complex numbers: Introduction to roots and radicals, simplifying radical expressions [No variables] Operations with radical expressions [No rationalizing binomials], Complex Number [i Notation only, No operations]

Quadratic equations and some conics: Special methods, completing the square, the quadratic formula, Parabolas [Graph by table]

UNIT-IV
SETS: Sets, subsets, equal sets, null set, universal set, finite & infinite sets, open & closed sets etc., operations on sets, partition of sets, cartesian product.

DIFFERENTIATION: Derivative, derivatives of sum, differences, product & quotients, chain rule, derivatives of composite functions.

UNIT-V
INTEGRATION Integral as limit of a sum, indefinite & definite integrals, methods of integration substitution, by parts, partial fractions, integration of algebraic and transcendental functions.

PLANE CURVES & POLAR COORDINATES: Polar coordinates, curve tracing in polar coordinates, area in polar coordinates, Arc length, area & volume of surface of revolution in Cartesian and polar coordinates.

Suggested Readings:
5. Shanti Narayan: Integral Calculus, S.Chand & Co.

***

BCA-106- COMPUTER ORGANIZATION

UNIT-I

UNIT-II
Building blocks of computer system: Basic building blocks – I/O, Memory, ALU and its components, Control Unit and its functions, Instruction – word, Instruction and
Execution cycle, branch, skip, jump and shift instruction, Operation of control registers; Controlling of arithmetic operations;

UNIT-III

Addressing techniques and registers: Addressing techniques – Direct, Indirect, Immediate, Relative, Indexed addressing and paging. Registers – Indexed, General purpose, Special purpose, overflow, carry, shift, scratch, Memory Buffer register; accumulators; stack pointers; floating point; status information and buffer registers.

UNIT-IV

Memory: Main memory, RAM, static and dynamic, ROM, EPROM, EEPROM, EAROM, Cache and Virtual memory.

UNIT-V

Interconnecting System Components: Buses, Interfacing buses, Bus formats – address, data and control, Interfacing keyboard, display, auxiliary storage devices and printers. I/O cards in personal computers. Introduction to Microprocessors and Microcontrollers: introduction to 8085 microprocessor, examples of few instructions to understand addressing techniques. Difference between microprocessor and microcontrollers.

Suggested Readings:
1. Andrew S. Tanenbaum, Structured Computer Organization, Printice Hall.
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.

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BCA-107 & 108

PRACTICAL I: PC SOFTWARE AND BASIC ELECTRONICS LAB.
Experiments based on papers BCA 102.

PRACTICAL II: C PROGRAMMING LAB.
Experiments based on paper BCA 103.

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(II-Year)

BCA-201- COMPUTER COMMUNICATIONS AND NETWORKING

UNIT-I

Data Communications: Data Transmission: Concepts of Frequency, Spectrum, bandwidth, Electromagnetic spectrum and frequencies for data communication, Fourier analysis, Data and signal, Transmission impairments, channel capacity, Nyquist bandwidth, Shannon capacity formula, decibels and signal strength, Transmission media: Coaxial, twisted pair, Comparative study of Categories of cables, Coaxial, Optical Fibers, Wireless transmission: Terrestrial Microwave, satellite, Broadcast Radio, Infrared.

UNIT-II
Data Encoding: (Brief idea of NRZ, Bipolar AMI, B8ZS, HDB3, ASK, FSK, PSK, PCM, AM, FM, PM), Spread Spectrum. Asynchronous and Synchronous transmission, Full and Half duplex, Interfacing, Functional and Procedural aspects of V.24, Data Link Control: Flow control: Stop and Wait, Sliding window, Error detection: Parity Check, CRC. Error control: Stop and Wait ARQ, Go back-N ARQ, Selective- Reject ARQ, Brief idea of HDLC and other Data Link control protocols

UNIT-III

UNIT-IV

UNIT-V
Principles of Internetworking, connection less Internetworking, IP, IPv6, IP multicasting. Routing protocols, TCP, UDP, SNMP, SMTP and MIME, HTTP.

Suggested Readings:
1. William Stallings: Data & Communications, Sixth Edition

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BCA-202- DATABASE MANAGEMENT SYSTEMS

UNIT-I
Introduction: Purpose of the data base system, data abstraction, data model, data independence, data definition language, data manipulation language, data base administrator, data base users, overall structure.
ER Model: entities, mapping constrains, keys, E-R diagram, reduction E-R diagrams to tables, generation, aggregation, design of an E-R database scheme.

UNIT-II
**Relational Model**: The catalog, base tables and views. Relational Data Objects - Domains and Relations: Domains, relations, kinds of relations, relations and predicates, relational databases.

**Relational Data Integrity**: Candidate keys and related matters: Candidate keys. Primary and alternate keys. Foreign keys, foreign key rules, nulls. Candidate keys and nulls, foreign key and nulls.

**UNIT-III**

**The SQL Language**: Data definition, retrieval and update operations. Table expressions, conditional expressions, embedded SQL. **Views**: Introduction, what are views for, data definition, data manipulation, SQL support.

**UNIT-IV**

**Network model**: basic concepts, data structure diagrams, DBTG CODASYL model, DBTG data retrieval facility, DBTG update facility, DBTG set processing facility, mapping networks to file, networks system.

**Hierarchical model**: basic concepts, tree structure diagrams, data retrieval facility, update facility, virtual records, mapping hierarchical to files, hierarchical system.

**UNIT-V**

**File and system structure**: overall system structure, file organisation, logical and physical file organization, sequential and random, hierarchical, inverted, nullist, indexing and hashing, B-tree index files.

**Suggested Readings**:  
1. Date C.J., Database Systems, Addision Wesley.  

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**BCA-203- FUNDAMENTALS OF OPERATING SYSTEMS**

**UNIT-I**

**Introduction**: What is an operating system? Mainframe, desktop, multiprocessor, distributed, clustered, realtime and handheld systems.

**Operating System Structures**: System components, operating system services, system calls, systems programs, system structure, virtual machines.

**UNIT-II**

**Process**: Process concept, process scheduling, operations on processes, cooperating processes. Inter process communication.

**CPU Scheduling**: Basic concepts, scheduling criteria, scheduling algorithms, algorithm evaluation.

**UNIT-III**

**Process Synchronization**: The critical section problem, semaphores, classical problems of synchronization.

**Deadlocks**: Deadlock characterization, methods for handling deadlocks. Deadlock prevention, avoidance and detection. Recovery from deadlocks.

**UNIT-IV**
**Memory Management:** Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

**Virtual Memory:** Demand paging, page replacement, allocation of frames, thrasing.

**UNIT-V**

**Linux:** History, design principles, kernel modules, process management, scheduling, memory management, file systems, input and output, inter process communication, network structure, security.

**Suggested Readings:**

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**BCA-204- DATA STRUCTURES USING ‘C’**

**UNIT-I**

**Linear Structure:** Arrays, records, stack, operation on stack, implementation of stack as an array, queue, operations on queue, implementation of queue.

**UNIT-II**

**Linked Structure:** List representation, operations on linked list - get node and free node operation, implementing the list operation, inserting into an ordered linked list, deleting, circular linked list, doubly linked list.

**UNIT-III**

**Tree Structure:** Binary search tree, inserting, deleting and searching into binary search tree, implementing the insert, search and delete algorithms, tree traversals

**UNIT-IV**

**Graph Structure:** Graph representation – Adjacency matrix, adjacency list, adjacency multilist representation. Orthogonal representation of graph. Graph traversals - bfs and dfs. Shortest path, all pairs of shortest paths, transitive closure, reflexive transitive closure.

**UNIT-V**

**Searching and sorting:** Searching - sequential searching, binary searching, hashing. Sorting – selection sort, bubble sort, quick sort, heap sort, merge sort, and insertion sort, efficiency considerations.

**Suggested Readings:**

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**BCA-205- SYSTEM ANALYSIS AND DESIGN**

**UNIT-I**

**Introduction:** System Concept and the need for system approach, Definition of system and system analysis, Factoring into subsystems, Black box system, Introduction to the basic elements of the system, Different types and behaviour of the system.

**UNIT-II**
The System Development Life Cycle and System Analyst: Source and inspiration of a new system development, Recognition and need, Linear approach and prototype approach, Different phases in SDLC, Role of System Analyst.

UNIT-III

UNIT-IV
System Implementation: Need of Testing, Test Plan, Quality Assurance, Trends in Testing, Audit Trail, Post Implementation Review, Project Scheduling, Selection of Hardware and Software

UNIT-V

Suggested Readings:
1. System Analysis and Design - E.M.Awad
2. System Analysis and Design - Dennis Wixom

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BCA-206- BUSINESS COMMUNICATIONS

UNIT-I
Concepts and Fundamentals: Meaning of communication, Importance of communication, Communication scope, Process of communication, Communication models and theories, Essentials of good communication - The seven Cs of communication, Factors responsible for growing importance of communication, Channels of communication, Verbal and Non-Verbal communication Formal and Informal communication Barriers of communication.

UNIT-II
Written Communication: Objectives of written Communication, Media of written communication, Merits and demerits of written communication, Planning business messages.


UNIT-III
Language Skills: Improving command in English, Choice of words, Common problems with verbs, adjectives, adverbs, pronouns, conjunctions, punctuation, prefix, suffix etc.

UNIT-IV

Arts of Listening: Good listening for improved communications, Art of listening, Meaning, nature and importance of listening, Principles of good listening, Barriers in listening.

Meetings: Definition, Kind of meetings, Advantages and disadvantages of meetings/committees, Planning and organisation of meetings.

UNIT-V
Job Application: Types of application, Form & Content of an application, Drafting the application, Preparation of resume.

Project Presentations: Advantages & Disadvantages, Executive Summary, Charts, Distribution of time (presentation, questions & answers, summing up), Visual presentation, Guidelines for using visual aids, Electronic media (power-point presentation).

Business Negotiation: Definition of negotiation, Factors that can influence negotiation, What skills do we need to negotiate, Negotiation process (preparation, proposals, discussions, bargaining, agreement, implementation).

Suggested Readings:
3. Successful Communication by Malra Treece.
5. Principles of Business Communication by Murphy and Hilderbrandth.

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BCA-207 & 208
PRACTICAL I: DATABASE MANAGEMENT & DATA STRUCTURE LAB.
Experiments based on the paper BCA 202. & 204

PRACTICAL II: BUSINESS COMMUNICATIONS LAB
Experiments based on the paper BCA 206. Atleast a 10 seat Language Lab must be established and used for English Communication (Language Skill, Oral Communications and Art of listening). Students are expected to go through well defined curriculum offered with English Language Lab Software.

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BCA-301- OBJECT ORIENTED PROGRAMMING USING C++

UNIT – I
Different paradigms for problem solving, need for OOP, differences between OOP and procedure oriented programming, abstraction, overview of OOP principles—encapsulation, inheritance and data binding polymorphism. abstraction. C++ basics: structure of a C++ program, data types, declaration of variables, expressions, operators, type conversions, pointers and arrays, strings, structures, references, flow control statement, functions-scope of variables, parameter passing, recursive functions, default arguments, inline functions, dynamic memory allocation and deallocation operators.

UNIT – II
C++ classes and data abstraction : class definition, class structure, class objects, class scope, this pointer, static class members, constant member functions, constructors and destructors, dynamic creation and destruction of objects, friend function and class, static class member. Overloading : function overloading, operator overloading – unary, binary operators.

UNIT - III
Inheritance : defining a class hierarchy, different forms of inheritance, defining the base and derived classes, access to the base class members, base and derived class construction, destructors, virtual base class. Polymorphism: static and dynamic bindings, base and derived class virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.

UNIT - IV
Templates - function templates and class templates, overloading of function template, static class member in class template. Exception handling: benefits of exception handling, throwing an exception, the try block, catching an exception, exception objects, exception specifications, rethrowing an exception, catching all exceptions.

UNIT-V
File handling : stream classes hierarchy, stream I/O, file streams, opening and closing data file, creating a data file, read and write functions, error handling during file processing. Standard template library (STL): component of STL, containers, iterators, algorithms, application of container classes.

Suggested Readings:
1. Object Oriented Programming with C++ : E. Balagurusamy.
3. Successful Communication by Malra Treece.
5. Principles of Business Communication by Murphy and Hilderbrandth.
**BCA-302- VISUAL APPLICATION DEVELOPMENT USING VB.NET 2010**


**BCA-303- LINUX ENVIRONMENT**

**UNIT-I**
**Overview of Linux**: What is Linux, Linux’s root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux Internals: Introduction, Process amangement, System Calls.

**UNIT-II**
**Linux File system**: Logging in, getting familiar with Linux desktop, shell interface, understanding Linux Shell, Types of Text Editors, using vi editor, prompt character, correcting typing errors, simple shell commands-date, cal, who, tty, uname, passwd, bc, script, echo, logging out, Environment variables, wild card characters, *, ?, absolute and relative path, listing files and directories commands, navigating file system- pwd, cd, mkdir, rmdir, Is, pr, Handling ordinary files- cat, cp, mv, wc, rm, comm., amp, diff, Basic files attributes – file permissions, changing permissions.

**UNIT-III**
**Processes and filters**: Simple filters- head, tail, cut, paste, sort, uniq, tr, Regular expression Grep utility, Shell command line, redirection, pipeline, spilt output, tee, and process- System Processes, internal and external commands, background process, premature termination of process, process priorities, process scheduling – (at, batch), nohup command

**UNIT-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.

**UNIT-V**
Decision taking- if else, nested if, file tests, string tests, case control structure. Loop control structure while, for, IFS, break, continue, $* and $@, logical operators && and || executing script, Debugging a script, Debugging a script, executing multiple scripts

**System Administration**: Configuration of Linux, Installation of Linux, Connecting to remote machines ftp, telnet, Adding and removing users.

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**BCA-304- MANAGEMENT INFORMATION SYSTEM**


**Planning and Organizing with MIS**: Information Planning, need of information for an organization, Steps in process of Strategic Planning, Managing international information system: The growth of international information system, Organising international information system managing global system. Implementation, Evaluation and Maintenance of the MIS: Implementation of MIS, steps and methods, Documentation, Evaluation of MIS, structure for evaluation, Maintenance of MIS.

**Information technology Infrastructure**: Computer hardware & software, system software, Categories of computer and Computer system, Information technology infrastructure, Storage input and output, telecommunication and Networks.

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**BCA-305- OBJECT TECHNOLOGY**

**Unit-I**


**Arrays and Strings**: Arrays, Arrays of Characters, String Handling Using String Class, Operations on String Handling Using, String Buffer Class.
Unit-II

**Extending Classes and Inheritance:** Using Existing Classes, Class Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super class-Object Class.

**Packages & Interfaces:** Understanding Packages, Defining a Package, Packaging up Your Classes, Adding Classes from a Package to Your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface.

**Exception Handling:** The concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining Your Own Exceptions

Unit-III

**Multithreading Programming:** The Java Thread Model, Understanding Threads, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks Inter-thread communication, Deadlocks

**Input/Output in Java:** I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

**Creating Applets in Java:** Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, Requesting Repainting, Using The Status Window, The HTML APPLET Tag Passing Parameters to Applets.

Unit-IV

**Working with Windows:** AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, Displaying Information Within a Window.


**Suggested Readings:**
1. The Complete Reference JAVA, TMH Publication.
2. Beginning JAVA, Ivor Horton, WROX Public.
3. JAVA 2 UNLEASHED, Tech Media Publications.
4. JAVA 2(1.3) API Documentations.
5. Any other book(s) covering the contents of the paper in more depth.

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**BCA-306- DIGITAL DESIGN**

Unit-I

Number System: Binary, Octal, Hexadecimal and Decimal, 1’s and 2’s Complements, Interconversion of numbers. Codes: BCD Code, Excess -3 Code, Gray code, Alphanumeric Codes, Parity Bits, Hamming Code, Floating Point Numbers.

Unit-II

Unit-III
Combinational Circuits, Implementing Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Magnitude Comparator, Parity Generator and Checker, De-multiplexers and Decoders, Encoders, Read Only Memory (ROM), Programmable Logic Array (PLA). R-S Flip Flop, Level Triggered and Edge Triggered Flip Flops, J.K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop, Synchronous and Asynchronous Inputs.

Unit-IV
Ripple Counter vs. Synchronous Counter, Modulus of a Counter, Propagation Delay in Ripple Counters, Binary Ripple Counters, Up/Down Counters, Decade and BCD Counters, Pre-settable Counters, Shift Register, Controlled Shift Registers.
RAM Architecture, Static RAM (SRAM), Dynamic RAM (DRAM)

Suggested Readings
5. Anand Kumar: Fundamentals of Digital Circuits, PHI.

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BCA-307 & 308

PRACTICAL I: VISUAL PROGRAMMING.
Experiments based on the paper BCA 302.

PRACTICAL II: LINUX.
Experiments based on the paper BCA 303.

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