

BCA — THIRD SEMESTER & FOURTH SEMESTER

(w.e.f. Academic year 2006 — 2007)

Sem No.	Paper No.	Title of the paper	Hrs /Wk	Marks		IA	Total Marks	
				Max	Min		Max	Min
III	BCA301	Computer Organization & Architecture	4	80	32	20	100	40
	BCA302	OOPS Using C++	4	80	32	20	100	40
	BCA303	Discrete Mathematical Structures	4	80	32	20	100	40
	BCA304	Visual Programming	4	80	32	20	100	40
	BCA305	Personality Development & Communication Skills	4	80	32	20	100	40
	BCA306	Computer Lab 3.1 (Based on BCA 302)	6	80	32	20	100	40
	BCA307	Computer Lab 3.2 (Based on BCA 304)	6	80	32	20	100	40
IV	BCA401	Design & Analysis of Algorithms	4	80	32	20	100	40
	BCA402	System Analysis & Design	4	80	32	20	100	40
	BCA403	System Programming	4	80	32	20	100	40
	BCA404	Data Communications	4	80	32	20	100	40
	BCA405	Microprocessors	4	80	32	20	100	40
	BCA406	Computer Lab 4.1 (Based on 401 & BCA 404)	6	80	32	20	100	40
	BCA407	Computer Lab 4.2 (Based on 405)	6	80	32	20	100	40

BCA — THIRD SEMESTER

BCA 301: COMPUTER ORGANIZATION & ARCHITECTURE

Total: 50 Hrs

DIGITAL LOGIC CIRCUITS: Logic gates Boolean algebra, map simplification, combinational circuits, flip-flop, and sequential circuits.

INTEGRATED CIRCUITS AND DIGITAL FUNCTIONS: Digital integrated circuits, IC flip-flops and registers, decoders and multiplexers, binary counters, shift registers, random - access memories (RAM) read-only memories (ROM)

DATA REPRESENTATION: Data types, fixed-point representation, floating-point representation, other binary codes, error detection codes.

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, computer instruction, timing and control, execution and instruction, input-output and interrupt, design of computer.

CENTRAL PROCESSOR ORGANIZATION: Processor bus organization, arithmetic logic unit (ALU), stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, microprocessor organization.

INPUT OUTPUT ORGANIZATION: Peripheral devices, I/O interfaces, asynchronous data transfer, direct memory access (DMA), priority interrupt, input-output processor (IOP).

MEMORY ORGANIZATION: Auxiliary memory, microcomputer, memory hierarchy, associative memory, virtual memory, cache memory, memory management hardware.

References:

1. M.Moris Mano, Computer System Architecture, 2nd Edition Prentice Hall of India (1991).
2. Heuring and Jordan, Computer systems design and Architecture, Pearson Education (2003)
3. William Stallings, Computer Organization and Architecture, Pearson Education (2003)
4. Floyd, Digital Fundamentals, 8th Edition, Pearson Education (2003)
5. Andrew S. Tenenbaum, Structured Computer Organization, 3rd Edition, Prentice Hall of India (1990)

BCA 302: OOPS USING C++

Total: 50 Hrs

1. Introduction : Procedural Languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Data Encapsulation, Data Hiding member functions, Reusability, Inheritance, Creating new Data Types, Polymorphism, Overloading, Dynamic binding, and Message passing. **(2 Hrs)**

2. C++ Features: The iostream class, C++ Comments, C++ Keywords, Variable declaration, The Const Qualifier. The endl, setw, setprecision, Manipulators, The scope resolution operator, The new & delete Operators.

(1 Hrs)

3. Functions: Simple Functions: Function declaration, calling the function, function definition; Passing argument to, returning value from function; passing constants, Variables, pass by value, passing structure variables, pass by reference, Default arguments, return statements, return by reference, overloaded functions; Different number of arguments, Different Kinds of arguments, inline function.

(7 Hrs)

4. Objects & Classes : Classes & Objects, Class Declaration, Class members; Data Constructors, Destructors, Member functions, Class member visibility; private, public, protected. The scope of the class object constructors; Default Constructor, Constructor with argument, constructor with default arguments, Dynamic constructor, copy constructor, Overloaded constructor, Objects as function arguments; member functions defined outside the class, Objects as arguments, returning objects from functions, class conversion, manipulating private Data members, Destructors, classes, objects & memory, array as class member data, Array of objects, string as class member

(12 Hrs)

5. Operator Overloading : Overloading unary operator: Operator Keyword, Operator Arguments, Operator return value, Nameless temporary objects, limitations of increment operator, overloading binary operator, arithmetic operators, comparison operator, arithmetic assignment operator, Data conversion; conversion between Basic types, Conversion between objects & Basic types, conversion between objects of different classes.

(6 Hrs)

6. Inheritance : Derived Class & Base Class : Specifying the Derived class accessing Base class members, the protected access specifier, Derived class constructor, Overriding member functions, public and private inheritance; Access Combinations, Classes & Structures, Access Specifiers, Level of inheritance; Multilevel inheritance, Hybrid inheritance, Multiple inheritance; member functions in multiple inheritance, constructors in multiple inheritance, Containership; Classes within classes, Inheritance & Program Development.

(8 Hrs)

7. Virtual Functions: Normal member function accessed with pointers, Virtual member functions accessed with pointers, Dynamic binding, pure virtual functions, Friend function; Friends for functional notation, friend classes, the ‘this’ pointer; Accessing Member Data with this, using this for returning values.

(5 Hrs)

8. Templates & Exception Handling: Introduction, Templates, Class Templates, function templates, Member function templates, Template arguments, Exception Handling.

(4 Hrs)

9. Streams: The Stream class Hierarchy, Stream classes Header file, string I/O: Writing strings, reading strings, character I/O, Detecting End — of — file. Object I/O; writing an object to disk, reading an object from disk, I/O with multiple objects; the f stream class, The open function, File Pointers; Specifying the position, Specifying the offset. The tellg Function, Disk I/O with Memory Functions; Closing Files, Error Handling, Command Line Arguments.

(5 Hrs)

Text books:

1. Prata: C++ Primer Plus, 4/e Pearson Education
2. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications

References:

1. Lippman: C++ Primer, 3/e Pearson Education
2. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill Publications.
3. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
4. Kamthane: Object Oriented Programming with ANSI and Turbo C++, Pearson Education
5. Bhawe: Object Oriented Programming Using C++, Pearson Education

BCA 303: DISCRETE MATHEMATICAL STRUCTURES

Total: 50 Hrs

1. Fundamental Principles of. Counting:

The rules of sum and product, Permutations, combinations, the Binomial Theorem, Combinations with repetitions. **(7 Hrs)**

2. Fundamentals of Logic: Basic connectives and truth Tables, Logical equivalence, the laws of logic, logical implication, rules of inference, use of quantifiers, quantifiers, definitions and proofs of Theorems. **(15 Hrs)**

3. Set Theory: Sets and subsets, set operations and the laws of set theory, counting and venn diagrams, Probability. **(7 Hrs)**

4. Properties of Integers and Mathematical Induction: The well — ordering principle, Mathematical induction, Recursive definitions, the division algorithm, prime numbers, the GCD, Euclid's algorithm, the fundamental theorem of Arithmetic. **(10 Hrs)**

5. Relations and functions: Cartesian Products and relations, Functions, plain & one —one function. Onto functions, stirling numbers of the second kind, special functions, the Pigeonhole Principle, function composition and inverse functions, computational complexity, Analysis of Algorithms. **(11 Hrs)**

Text Books:

- 1) Ralph. P. Grimaldi, Discrete and Combinatorial Mathematics, An applied introduction, Pearson Education (LPE) Fourth edition, 6th Indian Reprint, 2004. (Chapter 1 to 5).
- 2) Kolman, Busby & ross, Discrete Mathemaitcal, 5/e, Pearson Education 2003.

References:

- 1) C.L. Liu, Elements of discrete Mathematics, McGraw Hill, 1985.
- 2) Richard Johnsonbaugh, Discrete Mathematics, 5th Edition, Pearson Education (LPE) 2003.
- 3) Rajendra Akerkar and Rupali Akerkar, Discrete Mathematics, Pearson Education, 2004

BCA 304: VISUAL PROGRAMMING

Total: 50 Hrs

INTRODUCTION TO VB : the intergrated Development Environment - menu bar, tool bar, form designer, project explorer, properties window, form layout window. The VB editor. **(5 Hrs)**

THE FORM OBJECT : Properties, events and methods of forms; Properties - Name, Caption, Backcolor, Borderstyle, controlbox, maxbutton, minbutton, moveable, startup position, height, width, left, top, scalemode, window state; Events - load, unload, Click, Activate, Deactivate, Resize, methods- Show, hide, cis, unload, print. Controls -Properties and events of different controls such as commond buttons, labels, textboxes, image controls, timer, horizontal and vertical scroll bars, option buttons, check boxes, frames, lists and combo boxes.

(15 Hrs)

Predefined Dialog Boxes - MsgBox and InputBox.

PROGRAMMING IN VB : Data types, variables, declaration and scope, arithmetic operations, Study of form and code modules, private and public procedures. Main 0 procedure. Subs and Functions. Mathematical and string Functions; Branching and Looping Statements; If - Then, If - Then - Else and Nested If Statements; Select Case-different forms; For - Next, While - Wend and Do - Loops statements; Arrays -declaration. Static and dynamic arrays. Array() Function; menus and toolbars - Creating menus and toolbars, Working with the menu editor, Designing Multiple Document interface forms. Microsoft common controls.

OOP methods and properties of an object, class Modules, Encapsulation and Inheritance characteristics; Dynamic Link Libraries (DLLs) and Windows API; Designing Help files; File handling - Sequential, Random access and Binary files, Database connectivity - DAO and ADO Tables and Queries. ActiveX Data objects. **(30 Hrs)**

Text books:

1) Deitel, Visual Basic 6 How to Program. Pearson Education

References:

1. Neol Jerke, The Complete Reference Visual Basic 6, Tata McGraw Hill (1999).
2. Evangelas and Petroustos, Mastering VB 6, 1st Edition, **BPB** Publications(2001).
3. V.K. Jain, Introduction to OOP and VB, Vikas Publishing House (2003)
4. Gottfried, Programming with Visual Basic, Schaum's Series - Tata McGraw Hill.
5. Reselman, Peasley and Pruchniak, Using Visual Basic 6, PHI (2000).

BCA 305: PERSONALITY DEVELOPMENT & COMMUNICATION SKILLS

Total: 50 Hrs

1. Meaning and definition of Personality: Personality development as a process, Importance of personality development, Theories of Personality. Psychological theory (Sigmund Freud), Phenomenological theory (Care Rogers) Cognitive Theory (George A. Kelly). A trait factor — Analytic approach (Raymond B. Cattel), Psychosocial development theory (Erickson)

(15 Hrs)

2. Determinants of personality: Physical, intellectual, Emotional, social, educational, Familial.

(7 Hrs)

3. The self concept: Individual as a self sculptor, Process of perception cognition and their impact. Learning processes. What is attitude. The process of attitude formation.

(8 Hrs)

4. Communication and its importance: Process of Communication, Written and oral communication, Process of listening body language or non verbal communication, the art of public speaking.

(10 Hrs)

5. Leadership as a process: Working in a team, Management of conflict, interpersonal & intrapersonal intergroup, Profiles of great personalities, Career planning and role of career planning and role of career planning in personality development, How to face personal interview and group discussion.

(10 Hrs)

References:

- 1) Cloninger. Susan C. (2000), Theories of Personality, Prentice Hall, London,
- 2) Eriksen, Karin (1979) Communication Skills for Human Services, PrenticeHall, Reston
- 3) Hurlock, Elizabeth. B. (?), Personality Development.
- 4) Johnson, Roy Ivan (1956).Communication: Handling Ideas Effectively, McGraw Hill, New York.
- 5) Kagan, Jerome (1969), Personality Development, Harcourt Brace, New York,
- 6) Kundu, C.L. (1989), Personality Development, Sterling Bangalore.
- 7) Pervin Lawrence A. (1980). Personality: Theory, Assessment and Research, John Wiley & Sons, New York,
- 8) Rychman, Richard.M. (1978), Theories of Personality, D. Van Nostrand, New York.
- 9) Smith. Henry Clay (1968), Personality Development, MacGraw Hill, New York
- 10) Taylor. Anita et al (1992), Communication, Prentice= Hall, New Jersey.

PERSONALITY DEVELOPMENT & COMMUNICATION SKILLS

Preamble: The objective of every educational system is to prepare capable young men and women who can come up to the expectations of their teachers, parents, society and nation at large in facing the difficult challenges in the course of student life as well as post student life. Unless an individual looks at himself with an objective to assess what personality inputs he possess and what he needs to develop, the process of developing one's personality will not start. An individual if he has to contribute meaningfully to society, it is not enough that he is healthy physically, he has to be psychologically healthy. He must be socially as well as culturally healthy. He must have awareness of ethical values in life and he should be able to provide a framework for a just society. The philosophy of human resource development embraced by Government of India two decades back intends to stimulate an all round holistic development of the individual is so as all to enable him to play his role effectively. In the process of one's personality development it is necessary for an individual to know the psychological processes that lead to personality development which are best explained by theories of personality. Similarly, processes of perception and cognition will enable an individual to understand inherent limitations of an individual and make him more open-minded. The aspects of working in a team, building interpersonal relation leadership skills, collaborative processes managing intra personal, inter personal and group conflict are aspects, which play an important role.

Another most important dimension of personality is communication. Most of the time an individual is communicating either in written or oral form. The communication process needs to be properly understood and the individual must and should develop necessary skills, which can be developed through practice. Presentation skills such as conducting or giving a seminar, submitting a paper, doing public speaking are skills that can considerably alter the landscape of one's personality.

Objectives of the course:

1. To provide an understanding of what is personality and what are the processes of developing one's personality.
2. Make the student aware of his or her role in different settings such as son, daughter, sister, brother, neighbour, citizen and so on.
3. To create awareness about physical intellectual, emotional, social, familial, educational aspects of personality.
4. To provide skills of written and oral communication with a focus on skill development.

Methodology of Teaching: This course will be taught through lectures, class room discussion, case discussions, student presentation, case method as well as role play. Field assignments will also be given to student to meet people in the field and assess their personality development experience. Videocassettes, films on the topic can be shown. Eminent personalities should be invited to class room to present and interact with students.

Teacher shall provide an open environment where students will freely discuss and debate on various experiences, feelings and opinion.

Eligibility conditions for teachers: Teachers with Masters degree in Psychology, Sociology, management, Social Work and English with a flair for Human Resource Development are eligible to teach.

Scheme of examination:

20 internal marks will be given as below:

Class participation	5 Marks
Seminar	5 Marks
Class Test	5 Marks
Field assignment	<u>5 Marks.</u>
	20 Marks

The final paper will be 80 marks,

BCA - 306: COMPUTER LAB 3.1 (Based on BCA 302)

Sample programs:

- 1) Write a program to implement digital clock
- 2) Write a program to swap two numbers using friend function
- 3) Write a program to calculate area and circumference of circle using inline function
- 4) Write a program to create electricity bill
- 5) Write a program to prepare a shopping lists
- 6) Write a program to perform bank transaction
- 7) Write a program to perform addition of two matrices using operator overloading.
- 8) Write a program to perform multiplication of two matrices using operator overloading.
- 9) Write a program to find sum of complex number using friend function.
- 10) Write a program to implement operation on stack.
- 11) Write a program to add two distance variable.
- 12) Write a program to implement operation on queue.
- 13) Write a program to sort elements using templates.
- 14) Write a program to find the maximum of two numbers using template.
- 15) Write a program to compare two string using equal to operator.
- 16) Write a program to concatenate two strings.
- 17) Write a program to find maximum of 2 Nos. using friend function.
- 18) Write a program to create a student report using inheritance technique.
- 19) Write a program to add two time variable
- 20) Write a program to implement area of geometrical figures.

BCA - 307: COMPUTER LAB 3.2 (Based on BCA 304)

Sample programs:

- 1) Design an application to validate the user name and password and display appropriate message using message box control.
- 2) Application to change the font size, font and style of a text string using combo boxes.
- 3) Application to change the calculator using design array.
- 4) Application to design a calculator using design scrollbar.
- 5) Application to play AVI file containing audio and video using MCI control.
- 6) Application to play media files using active movie control or media player.
- 7) Application to design a screen saver (using timer).
- 8) Application to animation using animation control.
- 9) Application to move an image using a timer and command button controls.
- 10) Application to design MDI form to child and design the menu.
- 11) Design an application to establish connection to data base (Using data control).
- 12) Design an application to demonstrate sequential file access in VB.
- 13) Design an application to demonstrate the encryption and decryption in VB
- 14) Program to convert a number to wordings (up to 1000).
- 15) Program to display the message "welcome to Visual Basic" at the center of the Window with random fore color for the message and random back color for the form.
- 16) Program to display the message "welcome to Visual Basic" through out the Window with random fore color for the message.
- 17) Program to display a working analog clock at the center the form
- 18) **Windows API:** Program to display a form always on the top of other Windows.
- 19) Program to display the message "welcome to Visual Basic" in a label box. The label box should scroll from right to left.
- 20) Program to accept only numbers with fractional part using text box.

BCA — FOURTH SEMESTER

BCA 401: DESIGN AND ANALYSIS OF ALGORITHMS.

Total: 50 Hrs

1. Introduction: Definition of algorithm, Characteristic of algorithm, Different Control Structures, Writing Structured Programs, Analysis of algorithm

(5 hrs)

2. Divide and Conquer : General Method, Binary Search, Finding Maximum & Minimum., Merge Sort, Quick Sort, Selection Sort, Strassen's matrix multiplication.

(10 hrs)

3. Greedy Method: General method, Knapsack Problem, Job Sequencing with deadline, Minimum — cost Spanning trees, Optimal Storage on tapes, Optimal merge patterns, Single — Sour Shortest Paths,

(10 hrs)

4. Dynamic Programming: Introduction to Graphs, Definition types, Terms related to graph, General Method, Multistage Graphs, All pair Shortest Paths, Optimal binary Search trees, 0/1 — knapsack, The traveling salesperson problem, Flow Shop Scheduling.

(10 hrs)

5. Basic traversal & Search techniques: Search & traversal techniques for trees, Search & traversal techniques for graphs, Code Optimization, AND / OR Graphs, Game trees.

(8 hrs)

6. Backtracking: General method, The 8- Queens Problem, Sum of subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

(7 Hrs)

Text books:

1. Fundamentals of Computer algorithm - Ellis horowing, Sartaj Sahni, Sanguthevar rajasekarn.
2. Design & Analysis of algorithm- horowing, sahani.

References:

1. Addison Usekey , The design & analysis of Computer algorithms.
2. Alfred V. aho, John, E-hopocraft
3. Alter, Information Systems.

BCA 402: SYSTEM ANALYSIS AND DESIGN

Total: 50 Hrs

Systems Concepts and the Information Systems Environment: Introduction. The Systems Concept: Definition. Characteristics of a System: Organization, Interaction, Interdependence. Integration. Central Objective. Elements of a System: Inputs and Outputs. Types of a System.

The System Development Life Cycle: Introduction. The System Development Life Cycle. Considerations for Candidate Systems.

The Role of the Systems Analyst: Historical Perspective. The Multifaceted Role of the Analyst: The Analyst/User Interface.

System planning and the Initial Investigation: Introduction Bases for Planning in System Analysis, Initial Investigation.

Information Gathering: Introductions, Information Gathering Tools.

The Tools of Structured Analysis: Introduction, Tools of Structured Analysis.
Feasibility Study: Introduction, System Performance Definition.

The Process and Stage of System Design: The Process Design, Design Methodologies, Major Development Activities.

Input/output and Forms Design: Introduction, Input Design. **System**

Implementation: System Testing and Quality Assurance. **Text Books:**

1. Elias M. Awad, System Analysis and Design, Golgotia, (1995)

References:

1. Raja Raman V, analysis and Design of Information System, PHI, (1998)
2. Clifton H.D., Business Data Systems, PHI, (1999)
3. Henry C. Lucas, Analysis, Design and Implementation of Information Systems, PHI, (1996).
4. James A. Sen, Analysis and Design of Information Systems — McGraw Hill Int.Ed, (1996)

BCA 403: SYSTEM PROGRAMMING

Total: 50 Hrs

1. Background: Machine Structure, Evolution of the Components of a Programming System, Assembler, Loaders, Macros, Compilers, Formal Systems. (3 Hrs)

2. Machine Structure, Machine Language and assembly language.: General Machine Structure, Machine Language, Assembly Language (8 Hrs)

3. Assemblers: General Design Procedure, Design of assembler, Statement of Problem, Data structure, Format of databases, algorithm, look for modularity, Table Processing: Searching and Sorting., The problem, Searching a table, linear Search, binary Search, Sorting, interchange sort, Shell Sort, Bucket Sort, Radix Exchange Sort, address calculation sort, comparison of sorts, hash or random entry searching. (10Hrs)

MACRO LANGUAGE AND THE MACRO PROCESSOR: Macroinstruction, Features of macro facility, Macro instruction arguments, conditional macro Expansion, macro calls within macros, macro instructions defining macros., Implementation, Statement of problem, implementation of a restricted facility, A two pass algorithm. A single pass algorithm, implementation of macro calls within macros. Implementation within an assembler. (10Hrs)

LOADERS: Loader schemes, Compile & go, General loading Scheme, absolute loaders, Subroutine Languages, Relocating loaders, Direct linking loaders, other loading Schemes — Binders, linking loaders, Overlays, Dynamic binders. Design of absolute loader, Design of a Direct linking loader Specification of problem, Specification of data structure, format of data bases algorithm.

(10 Hrs)

COMPILERS: Statement of problem, Problem 1: Recognizing basic Elements, Problem2: Recognizing Syntactic cutis & interpreting meaning, Problem3: Storage allocation., Problem4: Code Generation. Optimization (machine independent) optimization (machine dependent), Assembly Phase, General model of compiler (6Hrs)

PHASES OF COMPILERS: Simple Structure of Compiler, Brief introduction to7 Phases of Compilers, (3 Hrs)

Text books:

1. John J. Donowon , System Programming, TATA McGraw-Hil.
2. Beck: System Software, 3/e Pearson Education

References:

1. Dhamdhare: System programming and Operating System TMH
2. Laudon & Laudon, Management Information Systems, 8/e. Pearson Education

BCA 404: DATA COMMUNICATIONS

Total: 50 Hrs

1. Introduction:-Communication Network and Services;, Approaches to Network Design — Network Functions and Network Topology, Message, Packet and Circuit Switching, Telegraph Networks & message switching, Telephone Networks and Circuit Switching, The Internet & Packet Switching ; Key factors in Communication Network Evolution; Layered Architecture and Applications — Examples of Layering, OSI Reference Model, TCP I IP Model Telnet FTP & IP Utilities. **(6 Hrs)**

2. Digital Transmission and Transmission Systems: Digital Representation of Information : Properties of digital transmission ; Characterization of Communication Channels Frequency Domain and Time Domain ; Fundamental limits in Digital Communication — The Nyquist Signaling rate, The shannon: channel capacity ; Line coding, Modems & digital Modulation; properties of media and digital transmission Systems — Twisted Pair, Coaxial Cable, Optical Fibre, Radio Transmission Infrared Light; Error detection and correction — Error detection, Two-dimensional parity checks, Internet checksum, Polynomial codes, standardized Polinomial codes, Error detecting capability of a polynomial code; Multiplexing — frequency — Division, Time — Division; SONET; Wavelength Division Multiplexing; Circuit switches; Telephone network; Signaling Traffic and Overload control in Telephone networks-Concentration, Roating Control, Overload controls; CellularTelephone Networks, Satellite Cellular Networks. **(16 Hrs)**

3. Peer-to-Peer Protocols :- Peer-to-Peer Protocols and service models ARQ Protocols stop and wait, Go-back-N Selective Repeat, Transmission efficiency of ARQ Protocols; Other adaptation functions, Sliding window flow control, Timing Recovery in Synchronous Services Reliable Stream Service, Data Link Control, HDLC, PPP ; Statistical Multiplexing. **(10 Hrs)**

4. Local Area Networks and Medium access Control Protocols :- Multiple access communications; Local Area Network — LAN Structure, MAC Sublayer, Logical link control layer; Random Access protocols ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Scheduling approaches to medium access control — Reservation Systems, polling, Token passing rings, comparison of Randomaccess & Scheduling access control' Comparison of Random access & scheduling medium access controls; Channelization — FDMA, TDMA, CDMA; LAN Standards — Ethernet and IIEF, 802.1 LAN Standard, Token Ring andIEEE 8025 LAN standard, FDDI, Wireless LAN's and IEEE 802.11 standard; LAN Bridges — Transparent Bridges, Source Routing Bridges, Mixed — mediaBridges. **(12 Hrs)**

5. Packet Switching Networks: Network services & Internal Network Operation; Packet Network Topology; Datagrams & Virtual Circuits; structure of switch/ Router, Connectionless packet switching; Virtual — Circuit packet switching ; Overview of Routing and congestion in packet networks — Routing algorithms classification, Routing tables, shortest path routing algorithms, Flooding, Hierarchical routing, Distance vector routing, Link state routing, congestion control algorithms. **(6 Hrs)**

Text Books:

- 1) Stallings, Data and Computer Communications, 7/e, Pearson Education, 2003
- 2) Alberto Leon-Garcia & Indra Widjaja, Communication Networks — Fundamental Concepts & Key architectures, Mc.Graw Hill — 2000.

References:

- 1) Andrew S Tanenbaum Computer Networks, 4/e, Pearson Education
- 2) S. Keshav, An Engineering Approach to Computer Networks, Pearson Education.
- 3) Behrouz Ferouzan, Introduction to Data Communications & NetworkingTMH, 1999.
- 4) Larry & Peterson & Bruce S Davis; Computer Networks Second Edition, Morgan Kaufman, 2000.
- 5) Halsa, Data Communication, Computer Networks and Open Systems.
- 6) Held, Understanding Data Communications.

BCA 405: MICROPROCESSORS

Total: 50 Hrs

1. Architecture and Operation: Introduction to 8085, Microprocessor organization / architecture & its operation, Microprocessor based system, memory interfacing, basic interfacing concepts, interfacing I/O devices.

(5 Hrs)

2. Programming the 8085: Programming model, instruction classification, Instruction format, Addressing modes, writing assembly level programs-overview of instruction set, timing diagrams. Data transfer, Arithmetic, Logic branch operations. Programming techniques - Looping, Counting and Indexing, 16 bit arithmetic operations, logic operations, Compare and rotate operations. Counters and Time delays, Generation of 1 μ s waveforms. Stacks and subroutines-conditional CALL and RETURN instructions. Advanced subroutine concepts. BCD to Binary and Binary to BCD conversions, BCD to 7 segment conversion, Binary to ASCII and ASCII to Binary code conversion, BCD addition and subtraction, multiplication and division.

(20 Hrs)

3. Memory Interface: Memory and I/O mapping and interfacing concepts.

(5 Hrs)

4. Interrupts: 8085 vectored interrupts, Restart as Software instructions, Additional I / O concepts and processes.

(5 Hrs)

5. Interfacing of peripherals (I / Os) and applications: Interfacing Keyboard (linear and matrix) and 7 segment display including multiplexes, 8279 programmable keyboard/display interface, 8255 PPI, 8259 PIC, DMA and 8257 DMA controller, Serial communication using 8251, D to A converters, A to D converters and interfacing, RS232 serial communication standards.

(15 Hrs)

Text Book:

1. R.S. Gaonkar - Microprocessor Architecture, Programming and Application with 8085. Penram Int. 3rd Edition.
2. Brey B Brey, The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium, Pentium Pro. Processor, 6th Edition, Pearson Education.

References:

1. Douglas V. Hall - Microprocessors and digital systems, MH.
2. Kenneth L. Short - Microprocessor and Programmed Logic", PHI, 2nd Edition.
3. Aditya P. Mathur - Introduction to Microprocessors, 3rd Edition TMH.

Coverage in the Text Book:

Architecture and Operation: Ch1-1. 1-3; Ch2-2.1-3; Ch3-3,1

Programming the 8085: Ch3, 3.21-25; CH 5, 5.1-5; Ch 6, 6.1-6; Ch7, 7.1-5; Ch 8, 8.1-5; Ch 9, 9.1-4; Ch10, 10.1-8

Memory Interface: Ch 3.3; Ch 4.1-4;

Interrupts: Ch 12 - 12. 1 - 4

Interfacing of peripherals (I/os) and Applications: Ch 14-14.1, 14.3; Ch 15-15.1, 15.2, 15.4-6: Ch 16.4

4. Antonakos: Introduction to Intel family of Microprocessors Pearson Education

5. Hoffer: Modern Systems Analysis and Design Pearson Education

6. Kendall, System Analysis and Design

BCA - 406: COMPUTER LAB 4.1 (Based on BCA 401)

Sample Programs:

1. Write a Program to Sort N Numbers Using Merge Sort Technique.
2. Write a Program to Sort N Numbers Using Quick Sort Technique.
3. Write a Program to Sort N Numbers Using Selection Sort.
4. Write a Program to Find the Minimum and Maximum Number in a Set of N Numbers Using Divide & Conquer Method.
5. Write a Program to Illustrate the Knapsack Problem for N Objects with M Weights. Calculate the Feasible Solution with Profit.
6. Write a Program to Find the Feasible Solution for Job Sequencing with Deadlines.
7. Write a program to find the Minimum Spanning Tree for the Given Graph Using Prim's Algorithm.
8. Write a Program to Find the Minimum Spanning Tree for the Given Graph Using-- Kruskal's Algorithm.
9. Write a Program to Find the Optimal Merge Pattern for the Given Files. Also Calculate the Weighted External Path Length.
10. Write a Program to Find the Shortest Path from the Specified Vertex to all other Vertices (Single Source Shortest Path Algorithm).
11. Write a Program to Find the Shortest Path from Each Vertex to all other Vertices (All Pair Shortest Path Algorithm).
12. Write a Program for N-Queens Problem. (The Output Should be in the form of Checker Board).
13. Write a Program for Multistage Graph. i. Using Forward Approach.
ii. Using Backward Approach.
14. Write a Program for Optimal Binary Search Tree.

BCA 407: COMPUTER LAB 4.2 (Based on BCA 405)

List of Experiments:

1. Exchange of two 16-bit numbers.
2. a) Addition & Subtraction of two 8-bit HEX numbers.
b) Addition of two 16-bit numbers.
3. a) Subtraction of two 16-bit numbers.
b) Two n-byte Number addition.
4. a) Block Transfer.
b) Block Transfer in reverse order.
5. a) 'N' Decimal Number addition.
b) Addition of HEX numbers until FF is encountered.
6. a) 4-Digit BCD addition.
b) 2's Complement of 8 & 16 bit number.
7. a) Subtraction of 16-bit number
b) Block Exchange
8. a) Implementation of Full Adder
b) Largest & smallest number in an Array
9. a) Exchange of Blocks in reverse order
b) Sorting of array in ascending order
10. a) Counting of +ve, -ve & Zeros
b) Check 2 out of 5
11. a)
 - i) Multiplication by successive addition.
 - ii) Multiplication by shift & add methodb) Division by successive subtraction.
12. a) Multiplication of 2 digit BCD
b) Division of 2 digit BCD.
13. a) Multiplication of 16-bit by 8-bit HEX.
b) Division of 16-bit by 8-bit HEX.
14. a) Addition & Subtraction of signed Numbers.
b) Addition of 2's Complement Numbers.
15. a) Frequency of occurrence of element.

- b) Inserting a given element.
- 16. a) Conversion of HEX to packed BCD.
- b) Conversion of Packed BCD to HEX.
- c) Conversion of HEX to ASCII.
- d) Conversion of ASCII to Hex.
- e) To calculate $y=X^n$
- f) Evaluate expression $(A+B)*(C+D)$
- g) Factorial of a given number.
- h) Sum & Average of n-one byte numbers.
- i) Square root of a given number.
- j) Conversion of Centigrade to Fahrenheit.

Interfacing Experiments:

- 17. a) Display 8-bit HEX counter.
- b) Display 8-bit BCD counter
- 18. Display Real time clock.
- 19. Flash & scroll 'GOODLUCK'.
- 20. ON & OFF LED's.
- 21. a) Converging & Diverging techniques.
- b) Program to Barcode indicator.
- 22. a) Program to generate Square wave.
- b) Program to generate Rectangular wave.
- c) Program for staircase wave.
- d) Program for sine wave.

BCA — FIFTH SEMESTER & SIXTH SEMESTER**(w.e.f Academic year 2007 — 2008)**

Sem No.	Paper No.	Title of the paper	Hrs/ Wk	Marks		IA	Total Marks	
				Max	Min		Max	Min
V	BCA 501	Operating Systems	4	80	32	20	100	40
	BCA 502	Internet Programming	4	80	32	20	100	40
	BCA 503	Data Base Management Systems	4	80	32	20	100	40
	BCA 504	Software Engineering	4	80	32	20	100	40
	BCA 505	Operations Research	4	80	32	20	100	40
	BCA 506	Computer Lab 5.1 (Based on BCA 502)	6	80	32	20	100	40
	BCA 507	Computer Lab 5.2 (Based on BCA 503)	6	80	32	20	100	40
VI	BCA 601	Computer Graphics	4	80	32	20	100	40
	BCA 602	E-Commerce & Web Designing	4	80	32	20	100	40
	BCA 603	Introduction to UNIX		80	32	20	100	40
	BCA 604	Object Oriented System Design	4	80	32	20	100	40
	BCA 605	Computer Networks	4	80	32	20	100	40
		Project Work						
	BCA 606 (A) BCA606 (B)	Project Report : Viva — voce	12	200 100	80 ----	---- ----	200 100	120

BCA — FIFTH SEMESTER

BCA 501: OPERATING SYSTEMS

Total: 50 Hrs

- 1. Introduction:** Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls, System programs, Virtual machines
(6 Hrs)
- 2. Process Management:** Process Concept, Process Scheduling, Co — Operating process, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling, Algorithm evolution.
(8 Hrs)
- 3. Process Synchronization and deadlocks:** The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks — System model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling.
(10 Hrs)
- 4. Memory Management:** Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging in Mastics and Intel 386, Virtual memory — Demand paging and its performance, Page replacement algorithms, Allocation of frames, thrashing, page size and .other considerations. Demand Segmentation
(10 Hrs)
- 5. File management (Systems, Secondary Storage Structure):** File Concepts, Access methods, Directory Structure, Protection and consistency semantics, File system structure, Allocation methods, Free space management, Directory Implementation, Efficiency and Performance, Recovery.
(8 Hrs)
- 6. Disk Management (Structure, Disk Scheduling Methods):** Disk Structure & Scheduling methods, Disk management, Swap — Space management **(4 Hrs)**
- 7. Protection & Security:** Goals of protection, Domain Protection, Access matrix, Security Problem, Authentication, One time password, program threats, System threads.
(4 Hrs)

Text books:

1. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, fifth Edition, Addison- wesley 19989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
2. Nutt: Operating Systems, 3/e Pearson Education 2004

References:

1. Milan Milonkovic, Operating System Concepts and design, IInd Edition,

McGraw Hill 1992.

2. Richard Peterson, Linux- The complete reference.
3. Tanenbaum, Operation System Concepts. Pearson Education.
4. Nutt, Operating Systems. Pearson Education.
5. Stallings, Operating Systems, Pearson Education.

BCA 502: INTERNET PROGRAMMING

Total: 50 Hrs

Introduction: Internet origin and development — interne architecture frame work-world Wide Web.

Introduction to JAVA: JAVA Evolution: Java History, Java Features, How Java Differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software requirements, Java Support Systems, Java Environment. Overview of JAVA Language: Introduction, Simple Java Program, More of Java, An Application with Two Classes Java Program structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Operators and Expressions; Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type conversion and Associativity, Mathematical Functions. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if . else Statement, Nesting of if else Statements, The else if Ladder, The Switch Statement, The ?: Operator. Decision Making and Looping: Introduction. The while Statement, The do Statement, The for Statement, Jumps in Loops Labeled Loops. (12 Hrs)

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and Methods, Finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One — dimensional Arrays, Creating an Array, Two — dimensional Arrays, Strings, Vectors, Wrapper Classes. (8 Hrs)

Interfaces, Packages, and Multithreaded Programming: **Interfaces:** Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. **Multithreaded Programming:** Introduction, Creating Threads, Extending the Thread Class,

Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. (10 Hrs)

Managing Exceptions, Applet Programming: Managing Errors and Exception: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. **Applet Programming:** Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, running the Applet, More about Applet Tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numerical Values, Getting Input from the User. (12 Hrs)

Graphics Programming, Input / Output: Graphics Programming: Introduction, The Graphics Class, Lines and rectangles, circles, and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts. **Managing Input / Output Files in JAVA:** Introduction, Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input / Output Exceptions, Creation of Files, Reading/Writing Characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Interactive Input and output, Other Stream Classes. (8 Hrs)

Text Books:

- 1) Shishir Gundavaram, CGI Programming on the World Wide Web, O'Reilly and Associates, (1996). (Chapter 1— 7)
- 2) E. Balaguruswamy, Programming with JAVA, A Primer, 211" Edition., TMH (1999), (Chapter 2 — 16)

References:

- 1) Thomas Boutel, CGI programming in C and Perl, Addison — Wesley, (1996).
- 2) Jeffrey Dwight et al, Using CGI, (Second Edition), Prentice Hall, India, (1997).
- 3) Darrel Ince & Adam Freeman, Programming the Internet with Java, Addison Wesley, (1997).
- 4) Ken Arnold & James Gosling, The Java Programming Language, Addison — Wesley, (1998)
- 5) Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, 3rd Edition, TMH, (1999).

BCA 503: DATABASE MANAGEMENT SYSTEMS

Total: 50 Hrs

1. Introduction: Database and Database Users, Characteristics of the Database Approach, Different people behind DBMS, Implications of Database Approach., Advantages of using DBMS. When not to use a DBMS. **(5 Hrs)**

2. Database System Concepts and Architecture: Data Models, Schemas, and Instances, DBMS Architecture and Data Independence., Database languages and interfaces, The Database system Environment, Classification of Database Management Systems. **(4 Hrs)**

3. Data Modeling Using the Entity-Relationship Model: High level Conceptual Data Models for Database Design with an example., Entity types, Entity sets, Attributes, and Keys, ER Model Concepts, Notation for ER Diagrams, Proper naming of Schema Constructs, Relationship types of degree higher than two. **(5 Hrs)**

4. Record Storage and Primary File Organization: Secondary Storage Devices. Buffering of Blocks, Placing file Records on Disk, Operations on Files, File of unordered Records (Heap files), Files of Ordered Records (Sorted files), Hashing Techniques, Other Primary file Organization. **(6 Hrs)**

5. Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce—Codd Normal Form. **(4 Hrs)**

6. Relational Data Model and Relational Algebra: Relational Model Concepts., Relational Model Constraints and Relational Database Schema, Defining Relations, Update Operations on Relations., Basic Relational Algebra Operations, Additional Relational Operations, Examples of Queries in the Relational Algebra, Relational Database design Using ER - to- Relational Mapping. **(6 Hrs)**

7. Relational Database Language: Data definition in SQL, Queries in SQL, Insert, Delete and Update Statements in SQL, Views in SQL, Specifying General Constraints as Assertions, Specifying indexes, Embedded SQL. **(5 Hrs)**

8. PL/SQL: Introduction, Exceptions & Cursor Management, Database Triggers, Functions, Procedures and packages. **(8 Hrs)**

9. Transaction Processing Concepts: Introduction, Transaction and System Concepts, Desirable properties of transaction, Schedules and Recoverability,

Serializability of Schedules, Transaction Support in SQL, Locking Techniques for Concurrency Control, Concurrency Control based on time stamp ordering, Optimistic Concurrency control techniques, Using locks for Concurrency Control in Indexes. **(7 Hrs)**

Text book:

1. Elmasri & Navathe, Fundamentals of Database Systems (Fourth Edition), Pearson Education, 2003.
2. Sundarraman, Oracle 9i programming A Primer, 1/e Pearson Education.

References:

1. Kahate, Introduction to Database Management System, Pearson Education 2004.
2. Abrahamnsi. Silberschatag, Henry. F. Korth, S. Sudarshan, Database System Concepts, Mc Graw hill.
3. Jefry. D. Ullman, Principles of database system.
4. Oracle Press .40RACLE - Computer reference
5. C.J. Date, Introduction to database systems, Sixth Edition, AddisonWesley, 1995.
6. Raghu Ram Krishnan, Database Management Systems, Second Edition,. Mc. Graw Hill, 2000.

BCA 504: SOFTWARE ENGINEERING

Total: 50 Hrs

- 1. Introduction:** Software Products and Software process, Process Models: Waterfall modal, Evolutionary Development, Bohemia's Spiral model, Overview of risk management, Process Visibility, Professional responsibility. **(4 Hrs)**
- 2. Computer based System Engineering-** Systems and their environment, System Procurement, System Engineering. Process, System architecture modeling, Human Factors, System reliability Engineering. **(3 Hrs)**
- 3. Requirements and Specification:** The, requirement Engineering Process, The Software requirement document, Validation of :Evolution of requirements, Viewpoint — oriented & method based analysis, System contexts, Social 7 organizational factors, Data flow, Semantic, Object, models, Requirement definition, Requirement Specification, Non functional requirement. **(8 Hrs)**
- 4. Software prototyping:** Prototyping in software process, Prototyping techniques, User interface prototyping. **(2 Hrs)**
- 5. Software Design:** Design Process, Design Strategies, Design Quality, System Structuring, Control models, Modular decomposition, Domain Specific architecture. **(5 Hrs)**
- 6. Object Oriented & function oriented design:** Objects, object Classes and inheritance, Object identification, An object oriented design example, Concurrent Objects, Data flow design, Structural decomposition, Detailed Design, A Comparison of design Strategies. **(5 Hrs)**
- 7. User interface design:** Design Principles, User System interaction, Information Presentation, User Guidance, Interface Evaluation. **(3 Hrs)**
- 8. Software Reliability and reusability:** Software reliability metrics, Software reliability Specification, Statistical testing, Reliability Growth modeling, Fault avoidance & tolerance, Exception handling & defensive programming, Software development with reuse, Software development for reuse, Generator based reuse, Application System Portability. **(8 Hrs)**
- 9. Software Verification and Validation:** The testing Process, Test Planning & Strategies, Black Box, Structural, interface testing, Program inspections, Mathematically based verification, Static analysis tools, Clean room software development. Mathematically based verification, Static analysis tools, Clean room software development. **(8Hrs)**

10. Management Issues: Project management, Quality management, Software cost estimation, Software maintenance. **(4Hrs)**

Text book:

1. Ian Sommerville, Software Engineering, 6th Edition, Pearson Publication Ltd. 2001

References:

1. Roger Pressman, Software Engineering — A practitioner's approach (McGraw Hill).
2. Carlo Ghejgietal, Fundamentals of Software- Engineering, Pearson Education.
3. Panakaj Jalote, An Integrated Approach to Software Engineering — Narosa Publishing house.

BCA 505: OPERATIONS RESEARCH

Total: 50 Hrs

I. Linear Programming Problems: Origin and development of operations research, Linear Programming Problem-formulation of Linear Programming problem, Graphical solution. Theory of simplex method. Use of artificial variables and their solution, Duality theory and Sensitivity Analysis.(20 Hrs)

II. Transportation Problem: Mathematical formulation of transportation problem, Initial Basic Feasible solution, North West corner rule, Matrix minima method, Vogel approximation method, for balanced Transportation Problem only. (8 Hrs)

III. Assignment Problem: Mathematical formulation of an Assignment problem, Assignment algorithm and simple illustrations. (8 Hrs)

IV. Network Analysis: Basic components of Network, Rules for drawing Network diagram, Time calculation in Networks. Critical Path Method and Project Evaluation and Review Techniques. Algorithm and flow chart for CPM and PERT. (8 Hrs)

V. Theory of Games: Two — person Zero — sum Games, the Maximin and Minimax principle, Saddle point and value of the Game. Game without saddle points, mixed strategies, solution for 2 x 2 games, Graphical method Dominance property, Linear programming method their solutions.(6 Hrs)

Text books:

1. Taha: Operations Research, 7/e. Pearson Education.
2. Hamady A. Taha Operations Research, Collin Mac Millan 1982.
3. Kani Swamp, P.K. Gupta and Man Mohan Operations Research, SultanChand and Sons, 4793/23, Darya Ganj, New Delhi — 110 002.
4. Rardin, Optimization in Operations Research.

Reference:

1. Billey E. Gillett, Introduction to Operations Research, Himalyal Publishing House, Delhi 1979.
2. Frederick S. Hiller, Gaxald, J. Deibermann, Operations Research, Holden Day Inc. 1974.
3. Narag. A.S., Linear Programming and Decision Making, Sultan Chand and Sons, 4793/23, Darya Ganj, New Delhi — 110 002.

BCA - 506: COMPUTER LAB 5.1 (Based On BCA 502)

Java Sample Programs:

1. Write a program to find factorial of list of number reading input as command line argument.
2. Write a program to find prime series reading N as command line argument.
3. Write a program to sort list of elements in ascending and descending order and show the exception handling.
4. Write a program to implement Rhombus pattern reading the limit form user.
5. Write a program to implement all bitwise operations read the input from user and display input, output errors.
6. Write a program to implement all string operations.
7. Write a program to find area of geometrical figures using method.
8. Write a program to implement constructor overloading by passing different number of parameter of different types.
9. Write a program to create student report using applet, read the input using text boxes and display the o/p using buttons.
10. Write a program to calculate bonus for different departments using method overriding.
11. Write a program to implement an applet by passing parameter to HTML.
12. Write a program to implement thread priorities.
13. Write a program to implement thread, applets and graphics by implementing animation of ball moving.
14. Write a program to implement mouse events.
15. Write a program to implement keyboard events.

BCA - 507: COMPUTER LAB 5.2 (Based On BCA 503)

Sample programs:

1. Consider the Insurance database given below. The primary keys are underlined and the data types are specified.

PERSON (DRIVER — ID #: string, name: string, address: string)CAR

(Regno: string, model: string, year: int)

ACCIDENT (report — number: int, date: date, location: string)OWNS

(driver — id #: string, Regno: string)

PARTICIPATED (driver — id #: string, Regno: string, report — number: int, damage amount: int)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter at least five tuples for each relation.
- iii) Demonstrate how you
 - a) Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
 - b) Add a new accident to the database.
- iv) Find the total number of people who owned cars that were involved in accidents in 2002.
- v) Find the number of accidents in which cars belonging to a specific model were involved.
 - vi) Generation of suitable reports.
 - vii) Create suitable front end for querying and displaying the results.

2. Consider the following relations for an order processing database application in a company.

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
 - ii) Enter at least five tuples for each relation.
 - iii) Product a listing: CUSTNAME, #oforders, AVG_ORDER_AMT, where the middle column is the total average order amount for that customer
 - iv) List the order# for orders that were shipped from *all* the warehouses that the company has in a specific city.
 - v) Demonstrate how to delete item# 10 from the ITEM table and make that field *null* in the ORDER_ITEM table.
 - vi) Generation of suitable reports.
 - vii) Create suitable front end for querying and displaying the results.
3. Consider the following database of students' enrollment in courses and books adopted for each course.

STUDENT (regno: string, name: string, major: string, bdate: date)

COURSE (course #: int, cname: string, dept: string) ENROLL

(regno: string, course#: int, sem: int, marks: int)

BOOK_ADOPTIO (course#: int, sem: int, book-ISBN: int)

TEXT (book — ISBN: int, booktitle:string, publisher string, author string)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter atleast five tuples for each relation
- iii) Demonstrate how you add a new text book to the database and make this book be adopted by some department.
- iv) Produce a list of text books (include Course #, Book — ISNI), Book — title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.
- v) List any department that has all its adopted books published by a specific publisher.
- vi) Generation of suitable reports.
- vii) Create suitable front end for querying and displaying the results.

4. The following tables are maintained by a book dealer.

AUTHOR (author — id : int, name: string, city: string, country: string) PUBLISHER

(publisher — id: int, name: string, city: string, country: string) CATALOG (book —

id: int, title: string, author —id: int, publisher — id: int, category

—id,: int, year: int, price: hit)

CATEGORY (category — id: int, description: string)

ORDER — DETAILS (order — no: int, book — id: int, quantity: int)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter atleast five tuples for each relation.
- iii) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
- iv) Find the author of the book which has maximum sales.
- v) Demonstrate how you increase the price of books published by a specific publisher by 10%.
- vi) Generation of suitable reports.
- vi) Create suitable front end for querying and displaying the results.

5. Consider the following database for a banking enterprise. BRANCH

(branch - name: string, branch - city: string, assets: real) ACCOUNT

(accno : int, branch - name: string, balance: real) DEPOSITOR

(customer - name: string, accno: int)

CUSTOMER (customer - name: string,, customer - street: string, customer -city: string)

LOAN (loan - number: int, branch - name: string, amount: real)

BORROWER (customer - name: string, loan - number: int)

- i) Create the above tables by properly specifying the primary keys and the foreign keys.
- ii) Enter atleast five tuples for each relation.
- iii) Find all the customers who have atleast two accounts at the main branch.
- iv) Find all the customer who have an account at *all* the branches located in a specific city.
- v) Demonstrate how you delete all account tuples at every branch located in a specific city.
- vi) Generation of suitable reports.
- vii) Create suitable front end for querying and displaying the results.

BCA - SIXTH SEMESTER

BCA 601: COMPUTER GRAPHICS

Total: 50 Hrs

- 1. Graphics Systems:** Display Devices, Hard Copy Devices, Interactive Input Devices, Display Processors, and Graphic software. **(4 Hrs)**
- 2. Output Primitives:** Points & Lines, Line drawing algorithms, DDA & Bresenham's line algorithms, Circle generating algorithms, Ellipses. Attributes of output primitives, line type, line width, line color, area filling, and Scan line algorithm. **(8 Hrs)**
- 3. Two Dimensional Transformations:** Basic transformations, translation, Scaling and Rotation. Matrix representations and homogeneous co-ordinates, composite transformation -translation, scaling and rotations. Raster methods for transformation. **(8 Hrs)**
- 4. Windowing and Clipping:** Windowing concepts clipping algorithms, line clipping, area clipping, Blanking window to view port transformations. **(6 Hrs)**
- 5. Interactive. Input Methods:** Physical input devices: keyboards touch panels, line, pens, graphics tablets, joysticks, mouse, trackball, interactive picture construction techniques. **(4 Hrs)**
- 6. Three Dimensional Concepts:** Three-dimensional co-ordinate systems, three-dimensional display techniques, perspective and, parallel projections, polygon surfaces, curved surfaces, octrees, three-dimensional transformations. **(6 Hrs)**
- 7. Hidden Surface and Hidden Line Removal:** Back-face removal, depth buffer Method, scan line method. **(8 Hrs)**
- 8. Shading and Color Mode:** User interface. **(6 Hrs)**

Text books:

- 1) Donald Hearn & M.Pauline Baker, Computer Graphics C Version, Pearson Educaiton/PHI
- 2) Computer Graphics - Steven Harrington, Mc-Graw Hills.
- 3) Dr. Venugopal K.R. Syeda Noor Fathima, H.S. Vemala, A programming Approach, programming with Fortran Pascal and C, TMH.

References:

- 1.Principles of Interactive Computer Graphics — Newman and Sproull, McGraw Hill
2. Graphics under C — Yeshwant Kanetkar, BPB Publications.
3. James D Foley, Adries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Addison Wesley, 1997.
4. Cooley: The Essence of Computer Graphics Pearson Education

BCA 602: E-COMMERCE & WEB DESIGNING

Total: 50 Hrs

1. Introduction: Electronic Commerce Environment and opportunities: Background. The electronic Commerce environment, Electronic marketplace technology. Modes of electronic commerce: Overview, Electronic Data Interchange (EDI), Migration to open EDI, e-commerce with Internet/WWW, Commerce Net advocacy, Web Commerce going Forward. Approaches to safe e-commerce: Overview, Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol, Secure Electronic Transaction, Certificates, for Authentication, Security on Web Servers and Enterprise Networks. **(10 Hrs)**

2. Payments and Security: Electronic Payment systems: Types, Digital Token-Based Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit card-based Electronic Payment Systems, Risk and Electronic Payment Systems, Designing Electronic Payment Systems. Master Card/Visa Secure Electronic Transactions: Introduction, Business Requirements, Concepts, Payment Processing email and Secure e-mail Technologies: Introduction, The means of Distribution. A Model for Message Handling. Working >of e-mail. MIME, S/MIME: and MOSS, Comparisons of security methods, MIME- and Related facilities for EDI over the Internet. **(10 Hrs)**

3. Applications — I: Consumer-Oriented e-Commerce: Applications, Mercantile Process Models, Mercantile Models from the Consumer's Perspective and from the Merchant's Perspective. Interorganizational Commerce and EDI: EDI, Applications of EDI in business, Legal, Security and Privacy Issues; EDI and e-commerce; Standardization and EDI. EDI Software Implementation, EDI Envelope for Message Transport, Value-added Networks, Internet — Based EDI Intraorganizational e-commerce. **(8 Hrs)**

4. Applications — II: Advertising and Marketing: The New Age of Information — Based Marketing, Advertising on the Internet, Charting the On-Line Market ii Process, Marketing Research. Consumer Search and Resource Discovery: Search and

Resource Discovery Paradigms. Information Search and Retrieval, e-Commerce Catalogs or Directories, Information Filtering, Consumer — Data Interface: Emerging Tools. Electronic Publishing: **EP** and Web — Based EP. **(7 Hrs)**

5. Web Design: Web design, Web design Process, Designing for others, site types and architectures, Navigation Theory and practice, Linkage: Text, Buttons, Icons and Graphics, Search and design, site maps, Indexes, and navigational and use aids. **(15 Hrs)**

Text Books:

1. Deitel, Internet and World Wide Web How to Program, Pearson Education, Asia.
2. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook, Tata McGraw Hill, (1998) (Chapter 1,2,3,6,7,11)
3. Ravi Kalakota, Andrew B. Whinston, Frontiers of Electronic Commerce, Addison-Wesley, (1996), (Chapter 1,7,8,9,10,11,13,14)

References:

1. Daniel Lynch and Leslie Lundquist, Digital Money: The New Era of Internet Commerce, John Wiley, (1996)
2. Laudon, E-Commerce, Pearson Education, Asia

BCA 603: INTRODUCTION TO UNIX

Total: 50 Hrs

1) **Background and some Basic Commands:** Brief history, Salient features of UNIX system, POSIX and the Single UNIX Specification, The UNIX Architecture, Locating commands, Internal and External Commands, Flexibility of Command Usage, **man:** Browsing and Manual Pages On-line, Understanding the man Documentation. **Cal:** The Calendar, **date:** Displaying and system Date, **echo:** Displaying a message, **printf:** An alternative to **echo**, **bc:** The Calculator, **Script:** Recording your session, **passwd:** Changing your pass word, **who:** Who are the Users? **uname:** Knowing your Machine's Characteristics, **tty:** Knowing your Terminal, **stty:** Displaying and setting Terminal Characteristics.

2) **The File System and some File Handling Commands:** The File, What's in a (file) name? The Parent — Child Relationship, The HOME Variable: The Home Directory, **pwd:** Checking your Current Directory, **cd:** Changing the Current Directory, **mkdir:** Making Directories, **rmdir:** Removing Directories, Absolute Pathnames, Relative Pathnames, **ls:** Listing Directory contents, The UNIX File System. **Cat:** Displaying and Creating files, **cp:** Copying a File, **rm:** Deleting files, **mv:** Renaming Files, **more:** Paging Output, The Ip Subsystem: Printing a File, **file:** Knowing the File Types, **wc:** Counting Lines, Words and Characters, **od:** Displaying Data in Octal, The **spell** and **ispell**, **cmp:** Comparing Two Files, **comm:** What is Common?, **diff:** Converting One File to other, **dos2unix:** and **unix2dos:** Converting Between DOS and UNIX, Compressing Files, **gzip**, **gunzip**, and **unzip** commands.

3) **File Attributes: ls — l:** Listing File Attributes, The — d Option: Listing Directory Attributes, Listing Mode number, listing hidden file, time associated with a file, listing timestamps. File ownership, File Permissions, **chmod:** Changing File Permissions, Directory Permissions, changing File ownership. File Systems and bodes, Hard Links, Symbolic Links and In, The Directory, **umask:** Default File nad Directory Permissions, Modification and Access Times, **find:** Locating Files.

- 4) **The vi Editor:** **vi** Basic, Input Mode — Entering and Replacing Text, Saving Text and Quitting — The ex Mode, Navigation, Editing Text, Undoing Last. Editing Instructions, (**u** and **U**) Repeating the Last Command (.), Searching for a Pattern (I and ?), Substitution — Search and Replace (:s), Customizing vi.
- 5) **The Shell:** The Shell's Interpretive Cycle, Pattern Matching — The Wild — cards, Escaping and quoting, redirection: The three Standard files, /dev/null and /dev/tty: Two Special Files, Pipers, **tee:** Creating a Tee, Command Substitution, Shell variables.
- 6) **The Process:** Process Basics, **ps:** Process. Status, System Processes (-eor-a), Mechanism of Process Creation, Internal and External. Commands, Running Jobs in Background, **nice:** Job Execution with Low Priority, Killing Processes with Signals, Job Control, fg and bg commands **at** and **batch:** Execute Later, **cron:** Running Jobs Periodically, **time:** Timing Processes.
- 7) **Communication In Unix:** **finger:** Details of Users, **mesg:** Your Willingness to communicate **write:** communication alternately, **talk:** Online Communication, **wall:** writing on all terminals, **news:** knowledge the local events, Email Basics, The **mail** command.
- 8) **Simple Filters and grep Family of Commands:** The Sample Database, **pr:** Paginating Files, **head:** Displaying the Beginning of a File, **tail:** Displaying the End of a File, **cut:** Slitting a File Vertically, **paste:** pasting Files, **sort:** Ordering a file, **uniq:** Locate Repeated and Non repeated Lines, **tr:** Translating Characters, An Example: Displaying a Word — count List. **Grep:** Searching for a Pattern, Basic Regular Expressions (BRE) — An Introduction, Extended Regular Expressions (ERE) and **egrep.**

Text Books:

- 1) Raymond, The Art of UNIX Programming, Pearson Education, Asia.

References:

- 1) Glass: Unix for Programmers and Users, 3/e Pearson Education
- 2) Kernighan: The Unix Programming Environment

3) Kochan: Unix Shell Programming Pearson

4) Venkateshmurthy, Introduction to Unix and Shell-Programming, Pearson Education.

BCA 604: OBJECT ORIENTED SYSTEM DESIGN

Total: 50 Hrs

Introduction: An overview of Object oriented Systems Development; why and Object Orientation?, Overview of the Unified Approach. Object Basics: Introduction, An Object-Oriented Philosophy, Objects, Classes, Attributes; Object Behavior and methods, Encapsulation and Information Hiding, Class Hierarchy, Polymorphism, Object Relationships, and Associations, Aggregations and Object Containment, Case Study: A payroll program, Advanced Topics. Object-Oriented Systems Development Life Cycle: Introduction. The software Development Process, Building High Quality software, Object-Oriented Systems Development: A Use Case Driven Approach

Reusability

(6 Hrs)

Methodology Modeling And Uml: Object Oriented Methodology:

Introduction: Survey of Some of the Object-Oriented Methodologies, Rumbaugh et al's. Object Modeling Technique, The Booch Methodology, The Jacobson et al, methodologies, Patterns, Frameworks, The Unified Approach, Unified Modeling Language: Introduction, Static and Dynamic Models, Why Modeling, Introduction to the Unified Modeling Language, UML Diagrams, UML class Diagram, Use-Case Diagram, UML Dynamic Modeling, Model Management: packages and Model Organization, UML, extensibility, UML Meta Model.

(8Hrs)

Object Oriented Analysis: Object Oriented Analysis Process- Identifying Use Cases: Introduction, Business Object Analysis: Understanding the Business Layer, Use-Case Driven Object- Oriented Analysis: the Unified Approach, Business Process Modeling, Use — Case Model, Developing Effective Documentation Case Study: ViaNet Bank ATM, Object Analysis- Classification: introduction, Classification Theory, approaches for Identifying Classes, Noun Phrase Approach, Common Class Patterns Approach, Use-Case Driven Approach Identifying Classes and Their Behaviours through Sequence

/ Collaboration Modeling, Classes, Responsibilities and Collaborators, Naming Classes, Identifying Object Relationships, Attributes, and Methods : Introduction, associations, Super-Sub Class Relationships, A-part-of Relationships-Aggregations, Case study, Class Responsibility: Defining Attributes by analyzing Use Case and other UML Diagrams, Defining Attributes for ViaNet Bank objects, Object Responsibility: Methods and messages, Defining Methods for ViaNet Bank Objects.

(12 Hrs)

Object Oriented Design: The Object- Oriented Design Process and Design Axioms: Introduction, The Object Oriented Design Process, Object Oriented Design Axioms, Corollaries, Design Patterns, Designing Classes: Introduction, The Object Oriented Design Philosophy, UML Object Constraint Language. Designing Classes: The Process, Class Visibility; Designing Well-Defined Public, Private and Protected protocols, Designing Classes: Refining Attributes, Refining attributes for the ViaNet Bank Objects, Designing Methods and Protocols, Designing Methods for the ViaNet Bank Objects, Packages and Managing Classes, access Layer-Object Storage and Object Interoperability: Introduction, Object Store; and Persistence; Database Management Systems, Organization and Access Control, Distributed Objects Computing , Object Oriented Database Management Systems, Object-Relational Systems, Multidatabase Systems, Designing Access Layer Classes , Case Study” Designing the Access Layer for ViaNet Bank ATM, View Layer designing Interface Objects: View Layer Classes, Macro-Level Process; Identifying View Classes by Analyzing Use Cases, Micro level Process, The Purpose of a View Layer Interface, Prototyping the User Interface, Case Study.

(12 Hrs)

Designing With Patterns:, GRASP Patterns for assigning Responsibilities: Introduction, Activities and Dependencies, Well-Designed Interaction Diagrams are valuable, Responsibilities and Methods, Responsibilities and Interaction Diagram Patterns, GRASP: patterns of General Principles in Assigning Responsibilities, The UML Class Diagram Notation, Expert Creator, Low Coupling, High Cohesion, Controller, Responsibilities, Role Playing and CRC

cards, More Patterns, and Designing with Patterns: GRASP general Responsibility Assignment Software Patterns, polymorphism, pure Fabrication, indirection, Don't Talk to Strangers, State(GOF) polymorphism (GRASP) singleton (Gof) Command (Gof) Development process issues: Introduction, Why? Guiding Principles of a Successful Process, Interactive and Incremental Development, Use Case Driven Development, Early emphasis on Architecture, Phases of Development, Length of Development Cycles, Development Cycles issues, Scheduling Development architecture layers. **(12 Hrs)**

Text books:

1. Ali Bahrami : Object Oriented Systems Development, McGraw hill,1999.
2. Criag Larman: Applying UML and Patterns, an Introduction to Object-Oriented Analysis and Design. Pearson Education 1998(Chapters 18;34,35,37)

References:

1. Booch: Object Oriented Analysis and Design Pearson Education
2. Rebecca Wirfs-Brock et al: Designing Object Oriented Software, Prentice-Hall India 1990
3. Grady Booch: Unified modeling Language User Guide, Pearson Education
4. Gamma: Design Patterns: Elements of Reusable Object Oriented Software, Pearson Education
5. Shalloway: Design Patterns Explained Pearson Education
6. Martin. J. and Odell, J: object oriented methods: A Foundation, Prentice Hall 1995

BCA 605: COMPUTER NETWORKS

Total: 50 Hrs

1. Introduction: computer networks and its applications, Network structure, network architecture, Topologies, LAN VAN MAN, The OSI reference model, The TCP /IP reference model, Services, network standards, example networks. **(4 Hrs)**

2. The Physical layer: Transmission and Switching , Frequency and time division multiplexing, Circuit switching, packet switching , hybrid switching, ISDN — integrated services digital networks, ISDN service, Evolution of ISDN, ISDN system architecture, the digital PBX, ISDN interface, ISDN signaling, Perspective on ISDN, Terminal handling, Polling Multiplexing versus concentration . **(10 Hrs)**

3. The medium access sub layer: The local metropolitan area networks, the ALOHA protocols, LAN protocols: Carrier Sense multiple access protocols, collision free protocols Limited Contension protocols. **(10 Hrs)**

4. The data link Layer: Data link Layer design issues, Error detection and correction, Elementary data link protocols, sliding window protocols, protocol performance, Protocol specification and verifications. **(10 Hrs)**

5. The Network Layer: Network layer design issue, Routing algorithms: Optimality principle shortest path routing Flooding Flow based routing Hierarchical routing, Broadcast Routing, Multicast Routing, Congestion control algorithms, Internetworking Network layer in the internet and ATM Networks. **(8 Hrs)**

6. The Transport Layer: Transport service, Transport protocols, Internet Transport Protocol (TCP & UDP). **(8 Hrs)**

Text Books:

1. Andrew S Tenebaum, Computer Networks, Forth Edition, Pearson Pub. 2002.

References:

1. Ulyses Mack , Computer Networks : Proto cols Standard and interfaces, PHI
2. James Martin,' Local area networks: Architecture and Implementation, PHI
3. Behrous Foruzan, Data Communication and Networking. TMI.
4. W. Stallings, Data and Computer Communications, Pearson Education.
5. Prakash Gupta, Data Communications, PHI.
6. James. F. Kurose & Keith W Ross, Computer Networking A TOP DOWN Approach Featuring the Internet, 2nd Edition, Pearson Education.

BCA 606: PROJECT WORK

BCA 606 (A)

Project Report

BCA 606 (B)

Viva-voce

Question Paper Pattern for all the Semesters

(Except BCA 105, BCA 205 & BCA 305)

- 1) **Theory:** There shall be eight questions in the question paper each carrying 16marks. The students have to answer any five questions.
- 2) **Practical:** The Practical marks of 80 shall be distributed as follows
 - i) Writing two programs including algorithm/flow chart ----- 30 Marks (15 each)
 - ii) Execution of two programs ----- 40 Marks (20 each)
 - iii) Laboratory record/journal and Viva - voce 10 Marks.

Total: 80 Marks