

NORTH LAKHIMPUR COLLEGE (AUTONOMOUS)**BCA PROGRAMME**
COURSE STRUCTURE

SEMESTER	COURSE CODE	TITLE	L T P	CREDIT
I	CT-3-BCA-101	INFORMATION & COMMUNICATION TECHNOLOGY	3 0 0	3
	CT-3-BCA-102	MATHEMATICAL FOUNDATION - I	3 0 0	3
	CT-4-BCA-103	PROGRAMMING AND PROBLEM SOLVING	3 1 0	4
	CT-3-BCA-104	DIGITAL DESIGN	3 0 0	3
	CT-3-BCA-105	INTRODUCTION TO THE LINUX PROGRAMMING ENVIRONMENT	3 0 0	3
	CP-4-BCA-106	LAB (ON PAPER 103, 105)	0 0 8	4
II	CT-4-BCA-201	MATHEMATICAL FOUNDATION-II	4 0 0	4
	CT-4-BCA-202	DATA & FILE STRUCTURE	3 1 0	4
	CT-4-BCA-203	OBJECT ORIENTED PROGRAMMING & DESIGN	3 1 0	4
	CT-4-BCA-204	COMPUTER ARCHITECTURE AND ORGANIZATION	4 0 0	4
	CP-4-BCA-205	LAB (ON PAPER 208, 209, 210,)	0 0 8	4
III	CT-3-BCA-301	FORMAL LANGUAGE AND AUTOMATA	3 0 0	3
	CT-4-BCA-302	OPERATING SYSTEMS	3 1 0	4
	CT-3-BCA-303	DATA COMMUNICATION	3 0 0	3
	CT-4-BCA-304	DATABASE MANAGEMENT SYSTEM	3 1 0	4
	CT-2-BCA-305	GRAPH THEORY	2 0 0	2
	CP-4-BCA-306	LAB (MYSQL /ORACLE & OS)	0 0 8	4
IV	CT-3-BCA-401	COMPUTER GRAPHICS	3 0 0	3
	CT-3-BCA-402	NUMERICAL & SCIENTIFIC COMPUTING	3 0 0	3
	CT-4-BCA-403	COMPUTER NETWORKS	4 0 0	4
	CT-3-BCA-404	WEB TECHNOLOGIES	3 0 0	3
	CT-3-BCA-405	SYSTEM SOFTWARE	3 0 0	3
	CP-4-BCA-406	LAB (ON PAPER 419, 420, 422)	0 0 8	4
	FT-0-ENV-407	ENVIRONMENTAL STUDIES	3 0 0	0
V	CT-4-BCA-501	DESIGN AND ANALYSIS OF ALGORITHMS	3 1 0	4
	CT-4-BCA-502	SOFTWARE ENGINEERING	4 0 0	4
	CT-4-BCA-503	ARTIFICIAL INTELLIGENCE	3 1 0	4
	PR-8-BCA-504	MINOR PROJECT	- - -	8
VI	ET-4-BCA-601 OR ET-4-BCA-602	OPERATION RESEARCH OR ADVANCED COMPUTING TECHNOLOGIES	4 0 0	4
	CT-2-BCA-603	INTERNALS OF UNIX/LINUX OS	2 0 0	2
	PR-14-BCA-604	MAJOR PROJECT	- - -	14

BCA 1st Semester

Code (Paper) : CT-3-BCA-101

Title : INFORMATION & COMMUNICATION TECHNOLOGY

Credit : 3

Total Marks : 60

Unit 1: Information Processing

Information: Concept of Information and Information Processing; Information Gathering, Storage, Processing, Retrieval, and Dissemination; Evolution of Information Processing.

Unit 2: Introduction to computer and information technology.

Brief history of development of computers, computer system concepts, capabilities and limitations, types of computers: Analog, Digital, Hybrid, general, special purpose, Micro, mini, mainframe, super computers, generations of computers, personal computers, Classification of Computers: Desk-top Workstations/ PCs, Mainframe, Super-Computer, Parallel computer; Client-Server Architecture.

Unit 3: Computer organisation and working:

Basic components of computer system, Input devices, output devices, storage devices.

Unit 4: Computer Softwares:

Need of softwares, types of software, system software and application software, programming languages, machine, assembly, high level, 4GL, their merits and demerits. Application software-word processing, spread sheet, presentation graphics, database management software. Introduction to Computer virus, Introduction to Operating Systems(Disk operating system, Windows, Linux, Unix etc.)

Books:

1. Introduction of Computer Sc. ITL ESL Pearson Education India

References:

1. Trainer T.N., Computers, 4th Edn, McGrawHill.

2. Rajaraman V., Fundamentals of Computers, 2nd Edn, PHI.

BCA 1st Semester

Code (Paper) : CT-3-BCA-102

Title : **MATHEMATICAL FOUNDATION - I**

Credit : 3

Total Marks : 60

Unit 1:

Mathematical Logic: Propositions, Compound propositions and their truth tables, Logical Equivalence, Conditional proposition, Converse, Contrapositive and inverse, Bi-conditional statement, Negations. Tautologies & Contradictions, Fallacies, Predicate Calculus.

Set Theory: Basic Concepts, Operation on sets, Venn diagram, Multi-set, Countable & uncountable sets, Cartesian product, Idea of Fuzzy sets.

Relation: Relations on sets, Types of Relations in a set, Properties & Representation of Relations, Closure of relations.

Function: Function, Types of functions, Recursively Defined functions, Growth of Functions.

Unit II:

Matrices: Notation & Definition, Types of Matrices, Matrix Arithmetic, Transpose of a matrix, Determinants, Elementary Transformations, Solution of Linear Equation by Matrix method, Rank of Matrix, Eigen values and Eigen vectors.

Unit III:

Combinatorics: The Fundamental Principles, Permutations & Combinations, Pigeon hole Principle, Binomial Theorem, Recurrence Relation, Generating Functions.

Possets & Lattices: Introduction, Partially Ordered sets, Lattice & sub-lattice.

Books:

1. Discrete Mathematics and its Applications, Kenneth H Rosen, Tata McGraw-Hill Education

References:

1. A text book of Discrete Mathematics, Swapan kr. Sarkar, S. Chand
2. Discrete Mathematical Structures, C L Liu

BCA 1st Semester

Code (Paper) : CT-4-BCA-103

Title : PROGRAMMING AND PROBLEM SOLVING

Credit : 4

Total Marks : 80

Unit I:

Notion of an algorithm, tools for design and analysis of algorithms - Flow chart, Decision table, Pseudocode. Concepts of m/c language and high level language.

Unit II.

Features of a high level language : Assignment statement, input-output statements; Expressions; data types; conditional statements, Iterative statements; Array data type and use of arrays; character data type and text processing; functional and procedural abstraction; Recursion; Pointer data type and simple applications of pointers. Structure and union, File Handling.

Example algorithms: string processing, root finding, matrix operations, record processing, searching, sorting, file handling etc. Documentation, Debugging.

Books:

1. Dromey, G: How to solve it by computer, PHI (EEE)
2. Kernighan and Ritchie: The C Programming Language

References:

1. Kanitkar: Let us C
2. Gottfried B: Programming with C

BCA 1st Semester

Code (Paper) : CT-3-BCA-104

Title : DIGITAL DESIGN

Credit : 3

Total Marks : 60

Unit I: Number Systems

Number system: binary, octal and hexadecimal; positive and negative numbers, fixed and floating point

Arithmetic operations: addition subtraction, multiplication and division of numbers

Character codes: ASCII, codes for error detection and correction, concept of hamming distance

Number system: binary, octal and hexadecimal; positive and negative numbers, fixed and floating point

Arithmetic operations: addition subtraction, multiplication and division of numbers

Character codes: ASCII, codes for error detection and correction, concept of hamming distance

Unit II: Logic Design:

Boolean algebra & Switching function. Minimization and realization using logic gates.

Unit III

Multiplexers , decoders, encoders.

Unit IV:

Flip flops, registers, and counters.

Books:

1. Digital & Logic Design, Morris Mano

References:

1. Modern Digital Electronics, R.P. Jain

BCA 1st Semester

Code (Paper) : CT-3-BCA-105

Title : INTRODUCTION TO UNIX/ LINUX ENVIRONMENT

Credit : 3

Total Marks : 60

Unit I:

Getting Started: The beginning at Bell Laboratories, GNU & Linux, UNIX Philosophy & Features

Day to day use: Day to day use: files & common commands, Locating Commands, Internal & external Commands. Arguments, Options & filenames, Flexibility of Command usage, On-line Help, When Things Go Wrong. :

General purpose Utilities: cal: The Calendar, date: Display System Date, who: login Details, tty: Knowing Your Terminal, uname: Know Your Machine's Name, passwd: Change Your Password, lock, echo, tput, bc, script, spell & ispell.

Unit II:

THE FILE SYSTEM: The File, What's in a File (Name)? The Parent-Child Relationship, pwd: Checking Your Current Directory, The Home Directory, Absolute Pathnames, Using absolute pathnames for a command,, cd: Changing Directories, mkdir: Making Directories, rmdir: removing directories, ls: Listing files, Relative Pathnames, The UNIX File System.

HANDLING FILES: Use of commands like cat, cp, rm, mv, more, split, cmp, diff, etc., file attributes, file permission, chmod, ls etc.

THE Vi EDITOR:

Working with vi / vim editor.

Unit III: Shell Programming

Books:

1. UNIX Concepts & Applications, Sumitabha Das, TATA McGRAW HILL

References:

1. UNIX Programming Environment – Brain W. Kernigham & Robert Pike.

BCA 1st Semester

Code (Paper) : CP-4-BCA-106

Title : LAB (C PROGRAMMING & LINUX)

Credit : 4

Total Marks : 80

UNIT I: Working with Windows, Dos
Dos commands, MS office etc...

UNIT II: Working with Unix/Linux
Commands used in course CT-3-BCA-104, Shell Programming

UNIT III: Programming Using C (to be done in linux / unix environment)

SIMPLE C PROGRAMS:

Find factorial of a number, Pascal's triangle, Real roots of a quadratic equation, Searching for Palindromes, Sequences/series like $2/9 - 5/13 + 8/17...$ etc

CONTROL STRUCTURES

Demonstrate the use of ternary operator, break, continue statement, type casting etc., Demonstrate the use of macros (substitution, with arguments, nesting etc), Demonstrate the difference between static & auto variable

ARRAYS

Compute mean, variance, and standard deviation, Merge two sorted arrays

MATRICES

Check if a matrix is magic square or not, Sort matrix row wise, Check singularity of a matrix

RECURSION

Factorial, GCD of two numbers, binary search, minimum & maximum of numbers, Fibonacci series.

STRINGS:

vowels, consonants, numbers, palindrome, Find the position of pattern in the main string, Sort string of names, Match pattern of the given string

FILES:

Perform the use of *getc*, *putc*, *getw*, *putw*, *fscanf*, *fprintf*, *fseek*, *ftell* etc., Creating, reading and modifying a data file, Creating & Updating an Unformatted data file containing Records(Customer records) and Locating & Processing the Records.

POINTERS:

Multiplication of Matrix, concatenate strings, function parameters.

STRUCTURES:

Process records using structures.

SEARCHING AND SORTING

Binary search, bubble sort, selection sort, insertion sort.

BCA 2nd Semester

Code (Paper) : CT-4-BCA-201

Title : MATHEMATICAL FOUNDATION-II

Credit : 4

Total Marks : 80

Unit I: Algebraic Structures

Operations, semi groups, Groups, Sub-groups, Normal Sub-groups & Homomorphism.
Rings, Integral Domains & Fields – fundamental concepts only.

Vector spaces and subspaces, linear independence, basis and dimension, row space, column space, null space, left null space, row rank, column rank, equality of row and rank of a matrix.

Unit II: Probability & Statistics

Introduction, sample space and Events, Finite Probability spaces, Conditional Probability, Independent events, Baye's Theorem.

Random Variable and its Probability Distribution Expectation, Moments and Variance of a random variable. Binomial Distribution, Poisson's Distribution and Normal Distribution.

Unit III: Transform Calculus

Laplaces transforms, inverse transforms, Fourier transforms, shifting on the s and t axes.

Books:

1. Discrete Mathematics and its Applications, Kenneth H Rosen, Tata McGraw-Hill Education

References:

1. A text book of Discrete Mathematics, Swapan kr. Sarkar, S. Chand
2. Lipschutz, Seymour; Lipson, Marc, *Discrete Mathematics*, Second Edition, Schaum's Outlines, Tata McGraw-Hill.
3. V.K.Khanna and S.K. Bhambri; *A Course in Abstract Algebra*; Vikash Publishing House.

BCA 2nd Semester

Code (Paper) : CT-4-BCA-202

Title : DATA AND FILE STRUCTURE

Credit : 4

Total Marks : 80

Data Structure

Time and Space analysis of Algorithms – Order Notations.

Linear Data Structures : Sequential representations – Arrays and Lists, Stacks, Queues, Strings; Link Representations – Linear linked lists, Circular linked lists, Doubly linked lists; Applications.

Recursion – Design of Recursive Algorithms, Tail Recursion.

Nonlinear Data Structures : Trees – Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height Balanced Trees and Weight Balanced Trees, Application of trees; Graphs – Representations, Breadth-first and Depth-first Search.

Hashing – Hashing Functions, Collision Resolution Techniques.

Sorting and Searching Algorithms : Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort.

File Structure

What is a File? Properties of Files, Types of file, Basic File processing operations: Opening, Closing, Reading, Writing, Seeking, **access mode** and **protection mode**.

Field and Record Organization: Data representation: Logically (record, field), physically (stream of bytes), Delineation of Records in a File: Fixed Length Records, Delimited Variable Length Records (variable length record, delimited record, and delimiter), Length Prefixed Variable Length Records, and Fixed Field Count Records.

Fixed Length Fields, Delimited Variable Length Fields, Length Prefixed Variable Length Fields, Representing Record or Field Length, Tagged Fields.

Books:

1. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, J. E. Ullman, Addison Wesley.
2. File Structures An Object-oriented Approach Michael J. Folk et. Al

BCA 2nd Semester

Code (Paper) : CT-4-BCA-203

Title : OBJECT ORIENTED PROGRAMMING & DESIGN

Credit : 4

Total Marks : 80

Basics of Object Oriented Programming (OOP)

Introduction to OOP- difference between OOP and procedure oriented programming – Classes, Objects and Methods – Overview of Inheritance and Polymorphism.

Object Oriented Design

Trends in software design- Notation of objects- Hybrid design method- Separation of responsibilities – Responsibility driven design- design phases and tools- step by step design – Grady Booch approach.

Data Abstraction: Class, Object, Constructors, Destructors, Member allocations for objects, New and Delete operators.

Inheritance: Single, multiple, multilevel inheritance, hierarchical inheritance

Polymorphism: Compile time polymorphism, Runtime polymorphism, Abstract Class, Dynamic Method Dispatch, Final Members and Classes.

Object Oriented Design

Object Oriented Design Approaches: Object Model, Dynamic Model, and Functional Model. (Object Diagram, State Diagram, and DFD).

Phases of Object Oriented Development: Object Analysis, System Design, Object Design.

Books:

1. Herbert Schild : The Complete Reference to C++, Osborne McGrawHill.
2. Rambaugh et al. : Object Oriented Modeling and Design, PHI(EEE).

BCA 2nd Semester

Code (Paper) : CT-4-BCA-204

Title : COMPUTER ARCHITECTURE AND ORGANIZATION

Credit : 4

Total Marks : 80

Unit I

The Von Neumann Architecture

Unit II:

ALU organisation: Simple ALU Organisation, Arithmetic Processor

Unit III

Control Unit: Hardwired and Micro-programmed Control

Unit IV

Memory Organization: Primary memory, secondary memory, high speed memory, virtual memory.

Unit V

I/O Transfer: Program controlled, Interrupt controlled and DMA

Unit VI

Introduction to computer buses, peripherals, performance bench marking and current trends in architecture.

Unit VII

Assembly language programming.

BOOKS:

1. Tanenbaum.A.S. *Structured Computer Organisation*, PHI,
2. Hamacher.V.C.Vranestic, Z.G.and Zaky,S.G. *Computer Organisation*,2/e McGraw-Hill

Reference:

1. J.P Hayes, *Computer Architecture and Organisation*, McGraw Hill
3. Pal Chaudhuri,.P. *Computer organisation and design*, PHI

BCA 2nd Semester

Code (Paper) : CP-4-BCA-205

Title : LABORATORY

Credit : 4

Total Marks : 80

Laboratory on Paper 202, 203, 204

BCA 3rd Semester

Code (Paper) : CT-3-BCA-301

Title : FORMAL LANGUAGE AND AUTOMATA

Credit : 3

Total Marks : 60

Unit I:

Finite Automata: Finite Automata, Finite Automata as output devices

Non-deterministic Finite Automata: Introduction to NFA, equivalence of NFA and DFA, pumping lemma, closure properties

Unit II:

Regular Expression: Introduction, Kleene closure, Formal definition, Algebra of regular expression, Regular languages

Unit III:

Context Free Grammar: Grammar and its classification, CFG, Push down automata (PDA), Non context free languages (CFL), pumping lemma for CFL, Equivalence of CFG and PDA.

Unit IV:

Turing Machine: Formal definition, Transition diagram, Construction of Turing Machine, language accepted and decided by Turing Machine, Chomsky Hierarchy.

BOOKS:

1. Lewis, H.R.Papadimitriou, C.h.; *Elements Of Theory Of Computation*, PHI.
2. Hopcroft, J.D. Ullman: *Introduction To Automata Theory, Language And Computation*, Addison -WEISLEY.

BCA 3rd Semester

Code (Paper) : CT-4-BCA-302

Title : OPERATING SYSTEM

Credit : 4

Total Marks : 80

Unit I:

Process Management: Process, Thread, Scheduling Concurrency, Mutual Exclusion, Synchronisation, Semaphores, Deadlocks.

Unit II:

Memory Management: Allocation, protection, hardware support, paging, segmentation.

Virtual Memory: Demand paging, allocation, replacement, swapping, segmentation, TBLs.

Unit III:

File systems: Allocation, free space management, directory management, mounting.

Unit IV:

I/O Management: Device drivers, Disk Scheduling, Block I/O; Characters I/O.

Use of Unix/Linux as a running example, examples from DOS, NT.

BOOKS:

1. Silberschatz A, Galvin P.B, *Operating System Concepts* 5/e , Addison-Wesley Publishing Compan
2. Tanenbaum, *Modern Operating System*

BCA 3rd Semester

Code (Paper) : CT-3-BCA-303

Title : DATA COMMUNICATION

Credit : 3

Total Marks : 60

Overview : Objectives and Applications of Computer Communication.

Computer Communication Network Architecture : ISO-OSI reference model, design philosophy, layer, protocol, interface, and service concepts. Layer-wise functionality.

Physical Layer : Concepts of data transmission, modulation and multiplexing methods, modem, encoding methods, communication media, standard protocols, RS-232C, RS-449, X.21.

Medium Access Control in broadcast networks :ALOHA, CSMA, CSMA/CD, token ring, token bus, Standard LAN Protocols (IEEE 802.X), FDDI, satellite networks.

Data link layer: Framing, error control techniques, datalink protocols and their performance, SDLC protocol.

Network layer : Routing, Congestion and deadlock control Algorithms, Internetworking issues and devices, gateways, bridges and routers, IP & X.25 protocols.

Books:

1. Tanenbaum A.S., Computer Network, PHI (EEE)
2. Stalling, Data and Computer Communication, PHI (EEE)

BCA 3rd Semester

Code (Paper) : CT-4-BCA-304

Title : DATABASE MANAGEMENT SYSTEM

Credit : 4

Total Marks : 80

Unit I: Databases and database users

Database System Concepts and Architecture: Data models, schemas and instances, DBMS architecture, database languages and interfaces, classification of DBMS

Unit II: Data Modelling Using E-R Model:

E-R model concept

Unit III: Relational Data Models:

Relational model concepts, relational model constraints, update operations on relations, defining relations, Relational algebra, Relational database languages: SQL

Unit IV: Conventional Data Models:

Network data model, hierarchical data model

Unit V: Database Design:

Functional dependencies and normalisation for relational database

Unit VI: Transaction Processing Concept:

Introduction, transaction and system concept, properties, schedules and recoverability, serializability of schedules, Concurrency control, error recovery and security.

Books:

1. Silberschatz A., Korth H.F., Sudarshan S., *Database System Concepts*, 3/e, McGraw-Hill (IE)
2. Elmasri R, Navathe S.B., *Fundamentals of Database Systems*, Benjamin Cummings Publishing Company

BCA 3rd Semester

Code (Paper) : CT-2-BCA-305

Title : GRAPH THEORY

Credit : 2

Total Marks :40

Graph : Incidence and degree; Handshaking Lemma; Isomorphism; Subgraphs and Union of graphs; Connectedness; Walks, Paths and Circuits; Components and Connectedness; Walks, Paths and Circuits; Components and Connectedness algorithms; Shortest Path Algorithms, Eulerian graph, Fleury's algorithm and Chinese postman problem; Hamiltonian graph - necessary and sufficient conditions; Traveling salesman; Bipartite graph.

Tree : Properties of trees; Pendant vertices in a tree; Center of a tree; Rooted binary trees; Spanning trees - Spanning tree algorithms; Fundamental circuits; Spanning trees of a weighted graph; cut-sets and cut-vertices; Fundamental cut-sets; Connectivity and separativity; network flow; max-flow min-cut theorem.

Planar graph : Combinatorial and geometric dual; Kuratowski's graph; detection of planarity; Thickness and crossings.

Matrix representations of graph: Incidence; Adjacency; matrices and their properties.

Colourings: Chromatic number : Chromatic polynomial; The six and five colour theorems; The four colour problem.

Directed graphs: Binary relations; Directed graphs and connectedness; directed trees; Abundance; Polish method; Tournaments.

Books:

1. Deo, N.: Graph Theory with Applications to Engineering and Computer Science.

BCA 3rd Semester

Code (Paper) : CP-4-BCA-306

Title : LAB (MySql / Oracle & OS)

Credit : 4

Total Marks :80

OS practical includes IPC
Basic sql commands to be performed.

BCA 4th Semester
Code (Paper) : CT-3-BCA-401
COMPUTER GRAPHICS
Total marks : 60

Unit I:

Introduction: Overview of graphics system: Video display devices, input devices, hard copy devices, graphics software

Unit II:

Output primitives: Points and lines, line drawing algorithms, circle and ellipse generating algorithms. Filled area primitives, attributes of output primitives

Unit III:

Geometrical transformations: Basic transformations, translations, rotation and scaling viewing and viewing functions

Clipping Operations: Point clipping, line clipping etc. Text clipping

Unit IV:

Introduction to computer animation and virtual reality

BOOKS:

1. D. Hearn and M.P.Baker, *Computer Graphics*, 2/e, PHI.

BCA 4th Semester

Code (Paper) : CT-3-BCA-402

NUMERICAL & SCIENTIFIC COMPUTING

Total marks:60

Unit I - Overview:

PROGRAMMING Language preliminaries; Floating-point representation of numbers with finite precision and its consequences, Concept of truncation and rounding-off errors, Stability, Consistency and Convergence

Unit II - Roots of Equations:

Iterative methods – bisection, false-position, Newton- Raphson; Solution of polynomial equations, Solution of Simultaneous Linear Equations – Gaussian elimination, pivoting

Unit III - Curve Fitting and Interpolation:

Method of least squares; Finite differences, Newton's interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula

Unit IV - Differentiation and Integration:

Differentiation by polynomial fit, Integration by Newton's Quadrature formula – Trapezoidal rule, Simpson's rules

Unit V - Numerical Solution of Differential Equations:

Solution by Taylor's Series, Euler's Method, Picard's Method, Runge-Kutta Method

BOOKS:

1. Grewal, B.S; *Numerical Methods*;
2. Krishnamurthy, E.V & Sen, S.K.; *Computer Based Numerical Algorithms*; East West Press

BCA 4th Semester
Code (Paper) : CT-4-BCA-403
COMPUTER NETWORKS
Total marks :80

Review of Computer Network Architecture and the Subnet layers.

IP Protocols: IPv4, IPv6, IP Security

Data Transport : Connection management, Quality of Service, TCP/IP Protocol, ATM.

Session Management: Session establishment and maintenance, Dialogue management, Recovery.

End-to-end Data: Presentation formatting issues and methods: XDR, ASN.1, NDR; Data Compression, Lossless Compression Algorithms- Run length encoding, DPCM, Dictionary-based methods, Image compression- JPEG, Video compression- MPEG; Security and authentication techniques, Encryption algorithms.

Applications: E-mail, Remote login, File transfer, Network file system, Network management.

Books/References:

1. Tanenbaum A.S., Computer Network, PHI (EEE).
2. Stalling W, Data and Computer Communication, PHI (EEE).

BCA 4th Semester

Code (Paper) : CT-3-BCA-404

WEB TECHNOLOGIES

Total marks :60

Basics of Internet

Client/Server Computing: What is C/S Computing, Middleware, Fat client VS Fat Servers, N-tiered Software Architecture.

Markup Languages And Their Grammers: SGML, DTD Resouce; HTML, CSS;

Web Browser: Browser Architecture, Configuration of Netscape and IE

Web Server Apache Architecture: Web Server Architecture, Server Features

Protocols: HTTP, FTP, SMTP, POP; JAVASCRIPT CGI PROGRAMMING JAVA

Overview of Java, JAVA Applet, JAVA Servlet;

ASP & JSP Search Engines; Web Database Connectivity;

CGI interface to Datatabase, JDBC interface to Database.

Web Security: S-HTTP, Fire Walls, Proxy Servers.

Semantic web, grid and cloud computing: General introduction only.

Books/References:

1. Shelly Powers et al., “Dynamic Web Publishing “, Techmedia.

BCA 4th Semester

Code (Paper) : CT-3-BCA-405

SYSTEM SOFTWARE

Total marks : 60

Unit I:

Overview: Definition and classification of system software.

Unit II:

Assembler; Assembly language, assembly process, assembler data structures, assembler macros and microprocessors.

Unit III:

Linkers and loaders: Basic concepts, static and dynamic linking, shared libraries, loaders, overlays.

Unit IV:

Compilers: Introduction and phases of a compiler: Lexical Analysis, parsing & intermediate code generation

Books:

1. *Compiler Design* , Aho, Ullman, Sethi
2. *System Programming & Operating System*, Dhamdhere, Tata Mc Graw Hill

CP-4-BCA-406

LAB

Practicals to be performed on paper 401, 402, 404

Code (Paper) : CT-3-BCA-401

COMPUTER GRAPHICS

Code (Paper) : CT-3-BCA-402

NUMERICAL & SCIENTIFIC COMPUTING

Code (Paper) : CT-3-BCA-404

WEB TECHNOLOGIES

CT-4-BCA-501

DESIGN AND ANALYSIS OF ALGORITHMS

Unit I: Basic algorithm analysis

Asymptotic analysis of upper and average complexity bounds: best, average and worst case behaviors, big-O, Ω and Θ notation: standard complexity classes; empirical measurements of performance; time and space trade-offs in algorithms; using recurrence relations to recursive algorithms.

Unit II: Fundamental algorithmic strategies

Brute-force: greedy: divide-and-conquer; backtracking; branch-and-bound; heuristics; pattern matching and string/text algorithms; numerical approximation.

Unit III: Fundamental data structure strategies

Implementation strategies for graphs and trees; performance issues for data structures.

Unit IV: Classes P, NP, Polynomials reducibility, NP-completeness.

Books:

1. Corman et al: Introduction to algorithms: McGraw Hill.

CT-4-BCA-502

SOFTWARE ENGINEERING

Unit I: Introduction To Software Engineering:

Concept of a software project, size factor, quality and productivity factor different phases of Software development life cycle

Unit II:

Software project management: Planning, scheduling, monitoring, controlling etc. requirement specifications

Software design: Function oriented , object oriented approaches, user interfaces.

Software programming: Structured coding techniques, coding styles, standard

Unit III:

Software verification and validation: Theoretical foundation, black box and white box approaches, integration and system testing

Software reliability: Definition and concept of reliability, software faults, errors, Repair and availability..

Unit IV:

CASE studies

BOOKS:

1. Mall R, *Fundamentals Of Software Engineering*, PHI.

REFERENCE:

1. Pressman, R.S. *Software Engineering: A practical Approach.* , McGraw-Hill,1997.
2. W.S. Humphery, *Managing software Procedures*, Addison-Wesley,1989

CT-4-BCA-503

ARTIFICIAL INTELLIGENCE

Introduction: AI problem; AI techniques, problem as a state space search, Production Systems, Issues in design of search programs.

Heuristic Search Techniques : Generate and test, Hill Climbing, Best-First Search, Problem reduction, Means- Ends analysis.

Knowledge representation & Reasoning: Knowledge representation issues, Ontological commitments. Predicate logic, knowledge representation using rules, weak slot-and-Filler structure.

Natural Language Processing : Syntactic processing, semantic analysis, Discourse and pragmatic processing.

Expert Systems : Representation using domain knowledge, Expert System shell, knowledge acquisition.

Books:

1. Russell & Norvig, *Modern Approach To Artificial Intelligence*

References:

1. Artificial Intelligence : E. Rich & K. Knight : Tata McGraw Hill.
2. Principles of Artificial Intelligence : N.J. Nilson; Narosa Pub. House.

CP-8-BCA-504 MINOR PROJECT

Tentative Area for Minor Project

1. Web Based project
2. Database Oriented
3. System Oriented
4. Information System

CT-4-BCA-601

OPERATIONS RESEARCH

Model Formulation: Introduction, Structure and assumption of an Linear Programming problem(LP), General mathematical model of linear programming problem.

Graphical Solution Method: Introduction, Definitions, graphical solution method of an LP problem, multiple optimal solution, unbounded solution, Infeasible solution.

Simplex Method: Introduction, standard form of LP problem, simplex algorithm (maximisation case), Simple Algorithm (Minimization case), multiple Optimal solution, Unbounded Solution

Duality: Introduction, Formulation of dual linear problem, standard results on duality, advantage of duality.

Transportation Problem : Introduction, Loops in transportation table and their properties, the transportation method, Linear programming formulation of the transportation problem, north west corner method for finding initial solution, Least cost method for finding initial solution. Vogel's approximation method for finding initial solution.

Test Of Optimality: Dual of transportation model, economic interpolation of U S and V S, step of MODI method.

Books:

1. J. K. Sharma; *Operation Research – Theory and Application*, MacMillan India Ltd. New Delhi.

References:

1. Richard Bronson; *Operation Research*; McGraw Hill

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ADVANCED COMPUTING TECHNOLOGIES

Mobile Computing: Mobile Connectivity - cells, Framework, Wireless delivery technology & switching methods (Microwaves, Satellites, Infrared Communication & Global Area Network), Mobile Internet Device (MID), Mobile Data internetworking standards (Wi-Fi), Cellular data communication Protocols (CDMA, GSM), Mobile Computing Applications (Devices, Limitations, Security Issues), Mobile Databases (client-server): protocols, scope, tools & technology. M Business.

E-Technology: Electronic Commerce – Framework, Media Convergence of Applications, Consumer Applications (GPS), Organization Applications (Rules and regulations). Electronic Payment Systems (Metro Smart Cards and Digital Tokens): Risks in Electronic Payment Systems, Designing Electronic Payment System. Electronic Data Interchange (EDI): Concepts, Applications, (Legal Security & Privacy) issues, EDI & electronic Commerce, Standardization & EDI, EDI Software Implementation, EDI Envelope for Message Transport,

Internet-based EDI. Digital Libraries & Data Warehousing: Concepts, Types of Digital documents (invoice, quote, RFP, Proposal), Issues behind document Infrastructure (Digital Signatures), Corporate Data Quality Management.

Software Agents: Characteristics & Properties of Agents, Technology behind Software Agents (Applets, Browsers & Software Agents).

Broadband Telecommunications: Concepts, Frame Relay (Standardized WAN originally designed for transport across ISDN), Cell Relay (Neither flow control nor error correction), Switched Multimegabit Data Service (SMDS), Asynchronous Transfer Mode (ATM) (Telecommunication Concept defined by ANSI and ITU). Main concepts in Geographical Information Systems (GIS), E-cash, E-Business, ERP packages.

Data Warehousing or Enterprise Data Warehouse (Benefits of Data Warehouse, Generic Data Warehouse environment), architecture of a data warehouse methodology, analysis, design, construction & administration.

Data Mining: Extracting models & patterns from large databases, data mining techniques, classification, regression, clustering, summarization, dependency modeling, link analysis, sequencing analysis, mining scientific & business data.

Books:

1. Data Mining: Concepts and Techniques, 2nd ed., Han and Kamber
2. Computer Networks, Tanenbaum
3. Schiller, *Mobile Communications*, Addison Wesley etc.

CT-2-BCA-603 INTERNALS OF UNIX / LINUX OS

History, systems structure, user perspective, operating system services, Architecture, system concepts,

Single and compound commands, shell scripts, use of c-programs, building command library of program.

Kernel data structure, system administration, Buffer cache, internal representation of files, systems call and c library system calls and library functions, systems calls for the file system.

The structure of processors - process and transaction, layout of system memory context of process saving the context of a process, manipulation of the process, address space, sleep process control - creation signals, termination, involving other programs the user ID of a process, the shell system boot and init process, process scheduling and time.

Memory Management policies - swapping, demand paging, hybrid system, the I/O sub system driver interfaces, disc drivers, terminal drivers, streams.

Inter process communication sockets, socket system calls, reserved ports and passing file descriptors socket implementation.

Advanced UNIX/ Linux programming concepts.

Books:

1. The Design of the UNIX operating system - by M, J. Boch
2. Advanced UNIX - A programming guide by Stephen Prata

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MAJOR PROJECT**

Any topic related to the field Computer Science which may have a practical implementation or may be research oriented.