SYLLABUS

FOR

Bachelor of Computer Application (BCA) Programme

H. N. B. GARHWAL UNIVERSITY
SRINAGAR (GARHWAL)
1. **Duration** of the BCA program shall be 3 years, divided into 6 semesters. Each semester should have 15 – 18 weeks.

2. **Eligibility for admission:** Intermediate with Mathematics from any recognized Board.

3. **Course Structure**
   Two kinds of courses/subjects/papers are offered - core courses and elective courses. Core courses are offered by the department conducting the programme. Elective courses are offered either by the department conducting the programme or by any other department.

   Elective courses should be relevant to the programme for which the student is admitted and are identified by the department.

   Each course shall have a unique alphanumerical code.

   No regular student shall register for more than 22 credits and less than 10 credits per semester.

   The minimum total credits required for the successful completion of a four semester BCA programme is 120.

4. **Evaluation** of all semester papers will be in two parts viz. Continuous Assessment (CA) and End Semester Assessment (ESA). *Thirty percent marks will be set apart for CA and seventy percent marks will be set apart for ESA, for theory, practical and project parts.* Weightage for theory, practical and project components will be according to the credit distribution.

5. **End Semester Assessment:**
   (a) **Question pattern (Theory part):** There shall be *eight questions carrying equal marks*. Each question may contain sub divisions also. Student has to answer any *five* full questions.
   
   (b) **Question pattern (Practical part):** One compulsory question that may contain sub divisions is to be attempted by the student.

6. **Grading:**
   As per University/UGC norms.

7. **Grade Card**
   7.1 The university under its seal shall issue to the students a grade card on completion of each semester and a consolidated grade statement at the end of the BCA.

   7.2 Grade card shall contain the following.
   
   a. Title of the courses.
   
   b. The credits associated with and grades awarded for each course.
   
   c. The number of credits earned by the student and the grade point average.
   
   d. The total credits earned by the student till that semester.

   7.3 The grade card issued on completion of the programme shall contain the name of the programme, the department / school offered the programme, the titles of the courses taken, the credits associated with each course, grades awarded, the total credits earned by the student, the CGPA and the class in which the student is placed.

8. **Ranking**
   Only those candidates who have passed all the papers in the first appearance within the minimum period will be considered for ranking on the basis of CGPA for the entire course.
9. **Attendance:** Will be applied as per university norms.

10. **Scrutiny shall be allowed as per the rules of the University.** Revaluation is not permitted.

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**Programme Structure**

**Bachelor of Computer Application (BCA)**

**FIRST SEMESTER:**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Course No.</th>
<th>Subject</th>
<th>Evaluation – Scheme</th>
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<tr>
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<td>General English</td>
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<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<td>Programming in ‘C’</td>
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<tr>
<td>4.</td>
<td>SET/CSE/BCA/C10 3</td>
<td>Mathematical Foundation of Computer Science</td>
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**Practical**

<table>
<thead>
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<td>Computer Fundamental Lab</td>
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**Total**  14  2  6  100  80  180  420  600  20

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**Practical**

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**Total**  14  2  6  100  80  180  420  600  20
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| Practical |            |         |               |        |
| 1. SET/CSE/BCA/EP5 1 | DSE1A Lab | - | - | 3 | 30 | - | 30 | 70 | 100 | 2 |
| 2. SET/CSE/BCA/EP5 2 | DSE2A Lab | - | - | 3 | 30 | - | 30 | 70 | 100 | 2 |

**Total: 14 2 6 100 80 180 420 600 20**

**SIXTH SEMESTER:**

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| Practical |            |         |               |        |
| 1. SET/CSE/BCA/EP5 1 | DSE4A Lab | - | - | 3 | 30 | - | 30 | 70 | 100 | 2 |
| 2. SET/CSE/BCA/EP5 2 | Project | 2 | 2 | 6 | 50 | - | 50 | 150 | 200 | 6 |

**Total: 12 4 9 110 60 170 430 600 20**

- **TA:** Teacher Assessment
- **CT:** Class Test
- **ESE:** End Semester Examination
- **SUB TOT.:** Subject Total
- **TOT.:** Total
## Discipline Specific Elective Papers

<table>
<thead>
<tr>
<th>DSE 1A</th>
<th>Discipline Specific Elective-1 (Choose One)</th>
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<tbody>
<tr>
<td></td>
<td>DSE 1A.1 Advance RDBMS</td>
</tr>
<tr>
<td></td>
<td>DSE 1A.2 Web Technologies</td>
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<td>DSE 1A.3 Computer Graphics</td>
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<table>
<thead>
<tr>
<th>DSE 2A: Discipline Specific Elective-2 (Choose One)</th>
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<tbody>
<tr>
<td>DSE 2A.1 ASP.NET</td>
</tr>
<tr>
<td>DSE 2A.2 C#</td>
</tr>
<tr>
<td>DSE 2A.3 SQL/PL-SQL</td>
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<thead>
<tr>
<th>DSE 3A: Discipline Specific Elective-3 (Choose One)</th>
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<tbody>
<tr>
<td>DSE 3A.1 Fuzzy Logic &amp; Neural Network</td>
</tr>
<tr>
<td>DSE 3A.2 Distributed and Parallel Computing</td>
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<tr>
<td>DSE 3A.3 Artificial Intelligence</td>
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<tr>
<th>DSE 4A: Discipline Specific Elective-4 (Choose One)</th>
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<tbody>
<tr>
<td>DSE 4A.1 Software Project Management</td>
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<tr>
<td>DSE 4A.2 Natural Language Processing</td>
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<tr>
<td>DSE 4A.3 Unix &amp; Shell Programming</td>
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<thead>
<tr>
<th>DSE 5A: Discipline Specific Elective-5 (Choose One)</th>
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<tr>
<td>DSE 5A.1 Compiler Designing</td>
</tr>
<tr>
<td>DSE 5A.2 Human Computer Interaction</td>
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<tr>
<td>DSE 5A.3 Unified Modeling Language</td>
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## Skill Enhancement Courses

<table>
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<tbody>
<tr>
<td>SEC1A.1 Office Automation Tools</td>
</tr>
<tr>
<td>SEC1A.2 Cyber Laws</td>
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<tr>
<td>SEC1A.3 Basic Programming Skills</td>
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<tr>
<td>SEC2A.1 Modeling and Simulation</td>
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<td>SEC2A.2 Graph Theory</td>
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<td>SEC2A.3 Boolean Algebra</td>
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<td>SEC3A.1 System Administration and Maintenance</td>
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<tr>
<td>SEC3A.2 Software Testing Concepts</td>
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<td>SEC3A.3 Multimedia and Applications</td>
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<tr>
<td>SEC4A.1 Android Programming</td>
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<td>SEC4A.2 XML Programming</td>
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**AECC: General English**

Introduction: Theory of Communication, Types and modes of Communication

Language of Communication: Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication

Speaking Skills: Monologue Dialogue Group Discussion Effective Communication/ Mis- Communication Interview Public Speech

Reading and Understanding Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts

Writing Skills Documenting Report Writing Making notes Letter writing

**References :**

4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
## Computer Fundamental

Introduction to Computers: Computer hardware Components, Disk Storage, memory, keyboard, mouse, printers, monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, WINDOWS, Functional knowledge of these operating systems. Introduction to Basic Commands of DOS, Managing File and Directories in various operating Systems, Introduction to internet, Basic terms related with Internet, TCP/IP. Algorithm development, techniques of problem solving, flowcharting, stepwise refinement algorithms for searching, sorting (exchange and insertion), merging of ordered lists.

Programming : Representation of integer, character, real, data types, constraints and variables, arithmetic expressions, assignment statement, logical expression; sequencing, alteration and interaction, arrays, string processing sub programs, recursion, files and pointers.
Structured programming concepts : Top down design, development of efficient programs; Program correctness; Debugging and testing of programs.

Element of a computer processing system : Hardware CPU, storage devices and media, VDU, input-output devices, data communication equipment software-system software, application software.
Programming languages : Classification, machine code, assembly language, higher level languages, fourth generation languages.

### References:
1. Raja Raman V : Fundamentals of Computers
2. Sanders D.H. : Computers Today
Programming in ‘C’

Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs. Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement.

Loops: for, while, do-while.

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

Arrays: Linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.

Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Momory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

File: File Handling in C

References:

1. V. Rajaraman, "Fundamentals of Computers", PHI
2. Pater Norton's "Introduction to Computer", TMH
3. Hahn, "The Internet complete reference", TMH
4. Peter Norton's, "DOS Guide", Prentice Hall of India
Mathematical foundation of Computer Science

Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function.

Mathematical Induction: Piano's axioms, Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behaviour of functions

Algebraic Structures: Properties, Semi group, monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Prepositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

References:
1. Liptschutz, Seymour, "Discrete Mathematics", TMH.
2. Trembley, J.P. & R. Manohar, "Discrete mathematical Structure with Application to Computer Science", TMH.
5. Gersting "Mathematical Structure for Computer Science", WH freeman and Macmillan
6. Kumar Rajendra, "Theory of Automata: Languages and Computation", PPM
Theory

1. SET/CSE/BCA/AE C2 Environment science 2 - - 10 20 30 70 100 2

Ability Enhancement Compulsory Course (AECC – Environment Studies)

Introduction to environmental studies • Multidisciplinary nature of environmental studies; • Scope and importance; Concept of sustainability and sustainable development.

Ecosystems • What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Natural Resources: Renewable and Non-renewable Resources • Land resources and landuse change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Biodiversity and Conservation • Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Environmental Pollution • Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies.


Field work • Visit to an area to document environmental assets: river/forest/flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river, Delhi Ridge, etc.

References:

Data Structure & File Organization


Queues: Array and linked representation and implementation of queues, Operations on Queue; Create, Add, Delete, Full and Empty, Circular queue, Dequeue, and Priority Queue. Link List: Representation and implementation of Singly linked lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List of Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.


Searching and Hashing: Sequential search, comparison and analysis, Hash Table, Hash Function, Collection Resolution Strategies, Hash Table Implementation.

Sorting: Insertion Sort, Bubble sorting, Quick Sort, Two way Merge Sort, Trees: Binary Search (BST), Insertion and Deletion in BST.

References:
1. Horowitz and Sahani, "Fundamentals of data Structures" Galgotia
2. R. Kruse etal, "Data Structures and Program Design in C" Person Education
3. A.M. Tenenbaum etal, "Data Structures and Program Design in C" Person Education
4. Lipschutz, "Data Structure", TMH
   Jhon Wiley & Sons, Inc.
**Programming in C++**


Class, Constructors, Friend Class: Introduction, Comparing class with Structure, Class Scope, Accessing Members of a class, Constructor, Destructor, Const objects, Const member functions, Friend class, Friend function, This pointer, Data abstraction and Information hiding, container classes and Iterators

Overloading & Inheritance: Operator Overloading, Fundamentals, Restrictions, Overloading stream, Insertion and stream extraction operators, Overloading unary & binary operators, Converting between types, Overloading ++ and --. Inheritance, Introduction, Protected members, Casting base _class pointers to derived _class pointers Overloading Base class members in a Derived class, Public, Protocols and Private inheritance, Direct base classes and Indirect Base Classes, Using Constructors and Destructors in Derived classes, Implicit Derived class object to base class object conversion.

Virtual Functions: Introduction, Type fields and switch statements, Virtual functions, Abstract base classes and concrete classes, Polymorphism, Dynamic binding, Virtual destructors.


**References:**
3. Herbert Scheldt, “Complete Reference”.
4. E. Balagurusamy “Object Oriented Programming with C++”.
Data Base Management System

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DMI, Overall Database structure. Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joints, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

Database Design & Normalization: Functional dependencies, normal forms, first, second third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

References:
1. Date C.J. "An Introduction to Database System". Addision Wesley
4. Paul Beynon Davis, "Database Systems" Palgrave Macmillan
Computer Networks

Introduction to Computer Networking: Use, advantage, structure of the communications network topologies the telephone network, analog to digital communication. Communication Between Analog Computers & Terminals Layered Protocols, Network & The OSI Models, Traffic control and accountability wide area and local area networks, connection oriented and connectionless networks, classification of communication protocols polling/selection systems, non-priority system priority system, rotation for layered protocols foals of layered protocols, network design problems, communication between layers, A parametric illustration, introduction to standards organizations and the ISO standard.

Polling/Selection, Satellite and Local area Networks: Binary synchronous control, other BSC system, conversion using satellite communication SPUS, and the Tele-port primary attribute of a LAN, IEEE LAN standards, LAN topology and protocols.

Switching and routing in Network: Telephone switching system, message switching, packet switching, packet switching support to circuit switching networks. The X.25 & Digital Networks: Layers of x.25, features of x.25 flow control principles, other packet type, x.25 logical channel states time out and time limits, packet formats, flow control and windows x.25 facilities, other standards layer the pad, communication networks communication between layers, advantage of digital networks, Digital’s switching, voice transmission by packet.

Personal Computer Network: Personal computer communications, characteristics, using the personal computers as server linking the personal computer to mainframe computers, semaphores of vendor offerings. File transfer on personal computers, personal computer and local area networks. Personal computer networks and the OSI models.

TCP/IP: TCP/IP and internetworking, example of TCP/IP operations, related protocols ports and sockets. The IP address structure, major features of IP, IP datagram, Major IP services. IP source routing, value of the transport layer, TCP, Major features of TCP, passive and active operation, the transmission control block (TCB), route discovery protocols, examples of route discovery protocols, application layer protocols.

References:

**Computer Based Numerical Techniques**

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation.


**References:**

1. Rajaraman V., "Computer Oriented Numerical Methods". PHI
2. Gerald and Wheatley, "Applied Numerical Analyses", AW
System Analysis and Design


The Role of the Systems Analyst: Historical Perspective, Academic and Personal Qualifications, the multifaceted role of the Analyst, The Analyst/User Interface, Behavioral issues.


Information Gathering: Kind of Information needed. Information about the firms, Information gathering tools, the art of Interviewing, Arranging the Interview, Guides to Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.


References:
**SEC1A.1 Office Automation Tools**

Introduction to MS office, Word Processing: Formatting Text, Pages, Lists, Tables, Spreadsheets: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table

Presentation Tools: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations

**References:**


**SEC1A.2 HTML Programming**

Introduction, The Basics: The Head, the Body, Colors, Attributes, Lists, ordered and unordered

Links: Introduction, Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link Within a Document, Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

Tables: Creating a Table, Table Headers, Captions, Spanning Multiple Columns, Styling Table

Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here

**References:**

1. Introduction to HTML and CSS -- O'Reilly, 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012

**SEC1A.3 Cyber Laws**

Definitions, Digital Signature And Electronic Signature, Penalty and Compensation for damage to computer, computer system, etc.

Tampering with Computer Source Documents, Punishment for sending offensive messages through communication service, etc.

Punishments for dishonestly receiving stolen computer resource or communication device, Punishment for identity theft. Punishment for cheating by personation by using computer resource, Punishment for violation of privacy, Punishment for cyber terrorism, Punishment for publishing or transmitting obscene material in electronic form, Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form, Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form, Breach of confidentiality and privacy

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Multimedia System and Applications


Production and Planning of Multimedia building blocks, Text, sound (MIDI), Digital Audio, Audio File Formats, MIDI under Windows environment, Audio and Video Capture.

Macromedia products, Basic drawing techniques, Advance animation techniques, Creating Multi layer combining interactivity and multiple scenes, Creating transparency effects using text in Flash, Flash animation.


Multimedia Application Planning, Costing, Proposal preparation, and Financing-Case study of a typical industry.

References:
1. Andreas Halzinger, "Multimedia Basics" Vol-I to VOL-III Firewall Media
5. Rosch, "Multimedia Bible" Sams Publishing
7. Steinreitz, "Multimedia Bible" Sams Publishing
Operating system Organization & UNIX

Operating system- definition, simple batch system, Time sharing system, Real time system, storage hierarchy, operating system service.

Process concept, process Scheduling, operating on process, co-operating process.

CPU Scheduling concepts, Scheduling algorithms, process synchronization, critical section problem, synchronization hardware, semaphores.

Deadlocks, deadlock characterization, deadlock prevention, avoidance detection and recovery.

Storage management Resident monitor, Logical versus physical address space, swapping, and segmentation, SCM.

Virtual memory, Demand paging, page replacement and page replacement algorithms, allocation of frames, thrashing.

File System: File supports, access methods, allocation methods-contiguous, linked and index allocation, directory system – single level, tree structured, acyclic graph and general graph directory, file protection.

Secondary storage structure: Disk structures, disk scheduling disk management, allocation methods, free space management.

Case study of the UNIX system: design principles, programmer and user interface, process, memory and file management.

References:

1. Peterson Abraham & Silbesschatz, Peter Galvin: Operating system concepts.
Software Engineering


Coding: Top-Down and BottomUp programming, structured programming, information hiding, programming style and internal documentation.

Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification and validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Software Project Management: The Management spectrum (The people, the product, the process, the project) Cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, project monitoring, risk management.


References:
3. Schaum's Series, "Software Engineering" TMH
4. Ghezzi Carlo and Others "Fundamentals of Software Engineering" PHI
SEC 2A.1: Modeling and Simulation

Systems and environment: Concept of model and model building, model classification and representation, Use of simulation as a tool, steps in simulation study.

Continuous-time and Discrete-time systems: Laplace transform, transfer functions, state space models, order of systems, z-transform, feedback systems, stability, observability, controllability. Statistical Models in Simulation: Common discrete and continuous distributions, Poisson process, empirical distributions.

Random Numbers: Properties of random numbers, generation of pseudo random numbers, techniques of random number generation, tests for randomness, random variate generation using inverse transformation, direct transformation, convolution method, acceptance-rejection.

References:

SEC 2A.2: Graph Theory
Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-
partite graphs, isomorphism of graphs, paths and circuits, Eulerian circuits, Hamiltonian
cycles, the adjacency matrix, weighted graph, travelling salesman’s problem, shortest
path, Dijkstra’s algorithm, Floyd-Warshall algorithm.

References:
1. Edgar G. Goodaire and Michael M. Parmenter, *Discrete Mathematics with Graph

SEC 2A.3: Boolean Algebra
Definition, examples and basic properties of ordered sets, maps between ordered sets,
duality principle, maximal and minimal elements, lattices as ordered sets, complete
lattices, lattices as algebraic structures, sublattices, products and homomorphisms.
Definition, examples and properties of modular and distributive lattices, Boolean algebras,
Boolean polynomials, minimal forms of Boolean polynomials, Quinn- McCluskey
method, Karnaugh diagrams, switching circuits and applications of switching circuits.

References:
DSE 1A.1 Advance RDBMS


Designing RDBMS for organization. Object modeling. Perspectives of Data Modelling.

Evolving the logical model. Transformation from Logical to Physical model.

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control. CODD’s 12 rules for a fully relational DBMS.

Data Integrity. Redundancy. Primary and Foreign keys.

Object database management. Database design and choosing the database server.

SQL and MySql. Database access and ODBC.

Middleware: Kinds of middleware. Sockets-talking to database, virtual database engine defined, web based middleware, Microsoft JET engine,

Database security and Recovery. Data Mining and Warehouse.

References:

1. Adv. DBMS by V.K. Jain, Cyber Tech Publication, 5A/13 Ansari Road, Daryagang, N.Delhi.- 110002
2. Date C.J. "An Introduction to Database System". Addision Wesley
5. Paul Beynon Davis, "Database Systems" Palgrave Macmillan

DSE 1A.2 Web technology

Communication Issues, the client, Multi-departmental & Large scale Websites, Quality Assurance and testing, Technological advances and Impact on Web Teams.


Common Gateway Interface (CGI), PERL, RMI, COM/DCOM, VBScript, Active Server Pages (ASP).

References:
1. Burdman, "Collaborative Web Development", Addison Wesley
2. Sharma & Sharma, "Developing E-Commerce Sites" Addison Wesley
3. Iva Bayross, "Web Technologies Part-II" BPB Publications
5. DON Box, "Essential COM" Addison Wesley

DSE 1A.3 Computer Graphics


Segment & Display files: Segments, Functions for segmenting the display file, Posting and posting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file structure.


Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3D Graphics: 3D Display Methods, 3D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.

Animation: Introduction to Animation to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational, Stochastic, etc. Animation Tools: Hardware-SGI, PC's Amiga etc.

References:
DSE 2A.1 ASP.NET

Introduction to .NET framework: Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation - Automatic Memory Management.


The Framework Class Library: NET objects - ASP .NET - .NET web services – Windows Forms


Creating Web Forms: Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

DSE 2A.2 C#

Language Basics: Datatypes & Variables Declaration, Implicit and Explicit Casting, Checked and Unchecked Blocks – Overflow Checks, Casting between other datatypes, Boxing and Unboxing, Enum and Constant, Operators, Control Statements, Working with Arrays, Working with Methods, Pass by value and by reference and out parameters

Features of Object Oriented programming

Exception Handling: What is Exception, Rules for Handling Exception, Exception classes and its important properties, Understanding & using try, catch keywords, Throwing exceptions, Importance of finally block, "using" Statement, Writing Custom Exception Classes.

Working With Collections and Generics: Importance of IList and IDictionary, Using ArrayList and Hashtable, Understanding IEnumerable and IEnumerator. Sorting Items in the collection using IComparable. Typesafety issue with ArrayList and Hashtable classes. Writing custom generic classes.

Working with Generic Collection Classes. Operator Overloading, Partial Class, Attributes, Reflection, Configuration

WinForms: Introduction, Controls, Menus and Context Menus, MenuStrip, ToolStrip, Graphics and GDI, SDI and MDI Applications, Dialogbox (Modal and Modeless)

Form Inheritance, Developing Custom, Composite and Extended Controls Other Misc topics, Working with Resource Files, Working with Settings

DSE 2A.3 SQL/PL-SQL
SQL Vs. SQL * Plus:
SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. Managing Tables and Data:
• Creating and Altering Tables (Including constraints)
• Data Manipulation Command like Insert, update, delete
• SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
• Join, Built in functions

Other Database Objects
• View
• Synonyms, Index

Transaction Control Statements
• Commit, Rollback, Savepoint

Introduction to PL/SQL
• SQL v/s PL/SQL
• PL/SQL Block Structure
• Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
• % TYPE and % ROWTYPE
• Using Cursor (Implicit, Explicit)

References:
DSE 3A.1 Fuzzy Logic & Neural Network


Real Life Applications of Fuzzy Logic and Neural Networks.

References:
3. 3.Principal of Artificial Intelligence, Nelson, Springer-Verlag.

DSE 3A.2 Distributed and Parallel Computing
Parallel and high-performance computers, Models and parallel computers, Basic communication operations, Performance and scalability, MPT and open MP programming.
Distributed processing potential, Forms of Distributed processing strategies, Hexagon Distributed computing, client server model.

References:
5. Stallings, William : Local Networks; An Introduction Macmillan publishing Co.

DSE 3A.3 Artificial Intelligence
Introduction: Definition and meaning of artificial intelligence, A.I. techniques, pattern recognition, Level of, speech recognition representation in A.I. properties of internal representation.
Production System: Different types of tracing, strategies, graph search strategies, Heuristic graph, search procedure, AND/OR graph, relationship between decomposional and compatible systems, searching Gate Tree, min-max search game playing, actual game playing.
Introduction to Predicate Calculus: Predicates and Arguments, connectives, Simplifications of strategies, extracting answers from Resolution Refutation. Control strategies.
Rule Based Deduction Systems: Forward and backward deduction system, resoling with AND/OR graph, computation, deduction and program synthesis, central knowledge for rules based deduct systems.
Managing Plans of Action: Plan interpreter, planning decisions, execution monitoring and re-planning domain of application robot motion planning and game playing.
Structural Object Representation: Semantic networks semantic market matching deductive operations on structured objects.
Architectural for A.I. Systems: Knowledge, acquisitions representation IMAGES PROCESSING, Natural language processing.

References:
1. Introduction to artificial Intelligence Eugene Charnik Drew MC mott
2. Artificial Intelligence Elaine Rice.
4. Artificial Intelligence Application Programming: Tim Jones, Wiley dreamtech
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**SEC3A.1 System Administration and Maintenance**

Part I (Linux/Unix) (8L)
- ✓ Basics of operating system, services,
- ✓ Installation and configuration, maintenance
- ✓ What is linux/unix Operating systems, Kernel, API, cli, gui,
- ✓ Difference between linux/unix and other operating systems
- ✓ Features and Architecture
- ✓ Linux features, advantages, disadvantages

Part II(Windows) (8L)
- ✓ Windows as operating system, history, versions.
- ✓ PC hardware, BIOS, Devices and drivers,
- ✓ Kernel Configuration and building
- ✓ Application installation, configuration and maintenance
- ✓ Server services and Client services
- ✓ Difference between WindowsXP/windows7 and windows server 2003/2008

**SEC3A.2 Software Testing**

Introduction


Functional Testing\ Black-box Testing

Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing

Structural Testing\ White-box Testing

Basis Path Testing: Program Graph, DD Path graph, Cyclomatic Complexity, Graph Matrices, Control Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage

**References:**

SEC3A.3 Multimedia Applications
Multimedia: Introduction to multimedia, Components, Uses of multimedia.
Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia,
Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals -
Connections, Memory and storage devices, Multimedia software and Authoring tools.
Images: Still Images – Bitmaps, Vector Drawing, 3D Drawing & rendering, Natural Light &
Colors, Computerized Colors, Color Palletes, Image File Formats.
Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.
Video: How Video Works, Analog Video, Digital Video, Video File Formats, Video Shooting and
Editing.

References:
DES4A.1  **Software Project Management**


**References:**

1.  Software Project Management by M. Cotterell
2.  Information Technology Project Management
3.  Management Information and Control by S. A. Kelkar

**DES4A.2  NATURAL LANGUAGE PROCESSING**

Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.


References:
4. L.M. Ivansca, S. C. Shapiro, Natural Language Processing and Language Representation
5. T. Winograd, Language as a Cognitive Process, Addison-Wesley
Basic Unix Commands: The Unix editors and vi; Redirection, Piping, Tees and filters; The Unix Utilities grep, sed, etc.

Overview of Unix Architecture: The kernel and the Shell; Processes and Time Sharing files and Directories; Peripheral Device as files.

Introduction the Shell Scripts: The Bourne and C-shells; Shell variables, scripts meta-characters and environment; the if and case statements; for, while and until loops.

System calls and the ‘C’ library: Discussion of the Unix system calls and ‘C’ library functions, the standard I/O Package; file handling; math library; command line parameters etc. The Unix ‘C’ interface; ‘C’ files and Graphics.

Introduction of systems Administration under Unix: The system Manager OLE and functions.

Different Tools: Debugging language development, System development different print formatting UNIX Tools.

Bourne Shell: Shell meta characteristics, shell variable, scripts, facilities, commands and environments, shell archive, idea about restricted shell, ROLC program.

Korn Shell: Shell variables and scripts, built in EDITOR, built in integer arithmetic, string manipulation capabilities, Command Aliasing, Array Job control.

C-Shell: Shell variables and scripts, shell facilities, history Integer Arithmetic Decision making and job control.

References:
2. Kernighlan & Pike : The Unix Programming Environment – PHI.
3. The Unix System Manuals.

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**DES5A.1 Compiler Designing**

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler.

Programming Language: High level languages, lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A Simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of EFG.

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive descent Parsers, Predictive Parser, Bottom-up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC

Intermediate Code Generation: Different Intermediate forms: Three address code, Quadruples & Triples, Syntax Directed Translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management.

Error Detection and Recovery: Lexical phase errors. Syntactic phase errors, semantic errors.

Code Optimization and Code Generation: Local optimization, Peephole optimization, Basic blocks and flow Graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

**References:**

2. A.V. Aho, R. Sethi and J.D.Ullman, "Compiler Principle, Tech & tools" AW
5. Modern Compiler Design: Dick Grune, Wiley dreamtech India Pvt. Ltd.
6. Starting Out with Modern Compiler “ David Gaddis Wiley dreamtech India Pvt. Ltd.

**DES5A.2 Human- Computer Interaction**

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,
The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.


Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.


References:
1. Human – Computer Interaction. Alan Dix, Janet Finlay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,

DE5A.3 Unified Modeling Language
Introduction: The Evolution of Technology, Structured Analysis and Design, Object-Oriented Technologies, Comparison between the main technologies.


Use Case Analysis: Discussion on use cases, terminology, notations and analysis, what they are and aren’t, Use case- an example, Use case- formal Scenario template.

Static chart Diagram: Composite states, nested states, Events, Simple transitions.

UML Activity and sequence diagrams: Usage and Syntax, Guarded Transitions, Synchronization Bars, Swim lanes Purpose, Proper Usage of Activity diagram. Transition time sequence diagram: Objective and Modeling guidelines, Objective Interaction, Sequence diagram- UML notation, Object and Stereotypes.

References:
1. UML distilled by Martin Fouler- Pearson Education.
2. Object –Oriented Modeling by James Raumbaugh, PHI.
3. UML a nutshell by Dan Pillone, O’Reilly Publication.
5. Designing Object-Oriented Software by Rebecca Wirf Brock, PHI.
SEC 4A.1 Android Programming


Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes), Images, Menu, Dialog.

Database: Understanding of SQLite database, connecting with the database.

References:

SEC 4A.2 XML Programming

Introduction: Understanding Mark-up Languages, Introduction to XML and its Goals.


Other XML Concepts: Scripting XML, XML as Data, Linking with XML.

XML with Style: XSL –Style Sheet Basics, XSL basics, XSL style sheets.

References:
2. Michael J. Young ,Step by Step XML , Microsoft Press, 2002

SEC 4A.3 PHP Programming

Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, scope of PHP, Basic Syntax, PHP variables and constants,
Types of data in PHP, Expressions, scopes of a variable (local, global), PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator. PHP operator Precedence and associatively
Handling HTML form with PHP: Capturing Form Data, GET and POST form methods, Dealing with multi value fields, Redirecting a form after submission.

PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, Goto, Break, Continue and exit

PHP Functions: Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local

String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String, Formatting, joining and splitting String, String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression
Array: Anatomy of an Array, Creating index based and Associative array, Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function

References:
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.