Bachelor In Computer Application (BCA)

Course Code and Details

Semester	Paper No.	Course Code	Title of Course	Credits	Compulsory/Elective
First Semester	**Compulsory Core Course**				
	2851	BCA-1.1	Computer fundamental and PC Software	4	**Compulsory**
	2852	BCA-1.2	'C' Programming and Data Structure	4	
	2853	BCA-1.3	Basic Mathematics	4	
	2854	BCA-1.4	Lab-1 Based on 'C' Programming and Data Structure	4	
	Discipline Centric Elective Course				
	2855 or 2856	BCA-E1 OR BCA-E2	Design and analysis of Algorithms OR Theory of Computation	4 OR 4	**Elective**
	Compulsory Foundation Course				
	2700	UGFODL	Foundation Course in Open Distance Learning	Non Credit	**Compulsory**
Credits of First Semester			**20**		
Second Semester	**Compulsory Core Course**				
	2857	BCA-1.5	Database Management System	4	**Compulsory**
	2858	BCA-1.6	RDBMS	4	
	2859	BCA-1.7	Basic Electronics	4	
	2860	BCA-1.8	Lab-2 (Based on Oracle)	4	
	Discipline Centric Elective Course				
	2861 or 2862	BAC-E3 OR BCA-E4	Data Mining OR E-Commerce	4 OR 4	**Elective**
	Elective Foundation Course (Select any one paper out of four papers)				
	002 OR 007 OR 010 OR 009	UGFST OR AOCHE OR AOCOM OR AOCNC	Foundation Course in Science and Technology OR Foundation Course in Human Environment OR Office Orgarnisation & Mnagement OR Foundation Course in Nutrition for the Community	4 OR 4 OR 4 OR 4	**Elective**
Credits of Second Semester			**24**		
Third Semester	**Compulsory Core Course**				
	2863	BCA-1.9	C++ and Object oriented Programming	4	**Compulsory**
	2864	BCA-1.10	Multimedia	4	
	2865	BCA-1.11	System analysis and Design	4	
	2866	BCA-1.12	Lab-3 (Based on C++)	4	
	Discipline Centric Elective Course				
	2867 or 2868	BCA-E 5 OR BCA-E6	Object oriented analysis and Design OR JAVA Programming	4 OR 4	**Elective**

		Compulsory Foundation Course			
	012	CHEQ/EA	Foundation Course in Environmental Awareness	Non Credit	

Credits of Third Semester **20**

			Compulsory Core Course		
Fourth Semester	2869	BCA-1.13	Computer Networks	4	**Compulsory**
	2870	BCA-1.14	Operating System	4	
	2871	BCA-1.15	Windows Programming	4	
	2872	BCA-1.16	Lab-4 (Based on Windows Programming)	4	
			Discipline Centric Elective Course		
	2873 or	BCA-E 7 OR	Network Programming OR	4 OR	**Elective**
	2874	BCA-E 8	Mobile Computing	4	
			Elective Foundation Course (Select any one paper out of four papers)		
	002	UGFST	Foundation Course in Science and Technology	4 OR	**Elective**
	OR 007	OR AOCHE OR	OR Foundation Course in Human Environment OR	4 OR	
	OR 010	OR AOCOM	OR Office Orgarnisation & Mnagement OR	4 OR	
	OR 009	OR AOCNC	Foundation Course in Nutrition for the Community	4	

Credits of Fourth Semester **24**

			Compulsory Core Course		
Fifth Semester	2875	BCA-1.17	Software Engineering	4	**Compulsory**
	2876	BCA-1.18	System Software	4	
	2877	BCA-1.19	Computer Graphics	4	
	2878	BCA-1.20	Lab-5 (Based on Computer Graphics)	4	
			Discipline Centric Elective Course		
	2879 or	BCA-E 9 OR	Web Technology OR	4 OR	**Elective**
	2880	BCA-E 10	Client Server Technology	4	
			Compulsory Foundation Course		
	2501	DM	Foundation Course in Disaster Management	Non Credit	**Compulsory**

Credits of Fifth Semester **20**

			Compulsory Core Course		
Sixth Semester	2881	BCA-1.21	Principle of Programming Language	4	**Compulsory**
	2882	BCA-1.22	Computer Organization	4	
	2883	BCA-1.23	Computer Oriented Numerical Techniques	4	
	2884	BCA-1.24L	Practical Lab based on BCA-1.23	4	
			Discipline Centric Elective Course		
	2885 or	BCA-E 11 OR	Computer Architecture OR	4 OR	**Elective**
	2886	BCA-E 12	Microprocessor and its applications	4	
			Elective Foundation Course (Select any one paper out of four papers)		

	002 OR 007 OR 010 OR 009	UGFST OR AOCHE OR AOCOM OR AOCNC	Foundation Course in Science and Technology OR Foundation Course in Human Environment OR Office Orgarnisation & Mnagement OR Foundation Course in Nutrition for the Community	4 OR 4 OR 4 OR 4	**Elective**
Credits of Six Semester			**24**		
Total 132					**Credits**

BCA-1.1 (Computer Fundamentals and PC Software)

Computer Fundamentals: Hardware & Software

Computer and Memory System: Computer, IC, Classification of Computers, Memory System, Characteristics terms for various Memory Devices, Primary storage, Auxiliary memory, Cache memory.

input/output Organization & New Technologies:input/output Devices, input/output Module Interface, External interfaces, parallel processing, pipelining, vector processing, Introduction to Risc.

Software Concepts and Terminology: Computer Software (System/Application Software) Categories of languages, (Machine, Assembly, High Level, 4-GL), Elements of a Programming language (variable, constants, Data type, Array and Expressions, input/output statement, Conditional and Looping Statement, Subroutine andFunctions).

Opening System Concepts: Definition, Evolution, Serial Processing, Batch Processing,Multiprogramming, Types of O.S. (Batch, Multiprogramming, Network,Distributed).

Computer Fundamentals: Communication, Networking, Security:

Fundamentals of Data Communication: Definitions, Concept of Data Communication, Data Communication modes (Synchronous and Asynchronous Transmission, Simplex, Half- duplexandFull-duplexCommunication),CommunicationHardware(SenderandReceiverHardware,Communicationdevices,CommunicationChannels).

Introduction to Computer Networks and Emerging Trends: Network Concept and classification, LAN (Star, Bus, Ring), WAN (Switching techniques WAN Devices/Hardware, Applications (E-mail, EDI), Networking Scenario (Internet, Bitnet, Compuserve, ISDN, NICNET). **The Management of Computer Security and Principles of Cryptography:** Definitions, Security Status on PC, Breaches of Security, Security Measures, (Physical, Software, Network, Password Security), Cryptography (Cipher Systems, DES), Cryptanalysis.

Computer Virus: The Evolution of virus, the process of infection, classification of viruses (BootInfectors,SystemInfectors,COMorEXEinfectors). Prevention,Thecure.

A Graphical User Interface:

Introduction to GUI: GUI, Evolution of the human and machine interaction, Common GUI terms(Pointingdevices,Bit-mappeddisplays,windows,menus,dialogboxes,Icons),MS-Windows, Windows-95.

Manage System in Windows 95: My Computer, System settings, Backup, your data, Disk Drive utilities, Add/Remove Applications, Set up windows for Multiple Users DOS Prompt.

Files and Folders: Windows Explorer Working with files working with Folders, Recycle Bin.

Program and Accessories: Run your programs, Windows 95, Accessories, Briefcase.

Communication through Network: Network setup & configurations logging, Onto the Network, mapping network Drives Network Browsing, Sharing Folders and printers.

Multimedia in windows 95: Multimedia Add-ons, Media types (Audio, Visual), Multimedia tools (CD player, Media player, Sound Recorder, Volume Control).

Sample GUI oriented Applications:

MS Word Basics: The word screen Getting to word documents typing and Revising text, Finding and Replacing, Editing and Proofing tools,

Formatting text: Formatting text characters, Formatting Paragraph, Document templates.

Page Design and layout: Page set up, tables.

Mail Merge and document Management: Mail Merge, Macros, protecting documents, printing a document.

Presentation graphics and power point: What is business graphics, (Types of Business Graphics How to make an effective presentation? Physical aspects of presentation), Apresentation graphics Package. PowerPoint, Creating a presentation, working with tools, slideshow.

BCA-1.2 ('C' Programming and Data Structures)

Introduction
Introductory: An overview of C, Escape sequences, Getting A "feel" forC.
Data types in "C": Variables of type (out, char, float, double,), Enumerated types, the typed of statement, Identifiers.
Operators and Expressions Inc: Elementary Arithmetic operations and operators, Expressions, L values and P values, Promotion and Demotion of variable types: The cast operator, Print f ( ) and Scan f ( ) functions.
Decision Structures in 'C': Boolean operators and Expressions The goto statement, the if (), Statement, the if ( ) – else statement,

Control structures – I: The do – while( ) and while Loops, the Comma Operator, the transfer of Central from within loops, Ternary operator, The Switch case default statement.

Programming in C
Control Structures II: 'The for (;;) loop, one-dimensional Arrays, The sizeof operator, storage classless and scope.
Pointers and arrays: Pointer variables and pointer Arithmetic, Pointers, Arrays and the subscript operator, A Digression on Scan f(), Multidimensional Arrays.
Functions: Function Prototypes and Declarations, Functions and Scope, Pointers as Function Arguments, String Functions, Multi-Dimensional Arrays as Function Arguments.
FunctionsII: Recursivefunctions,Macros,ConditionalCompilation,MacroswithParameters, CommandlineArguments,VariablelengthArgumentlists,ComplicatedDeclarations,Dynamic MemoryAllocation.
Files and Structs, Unions and Bit-Fields: Files and File 70, Structs, the DOT Operator, Extructs and files : f seek ( ), Structs and Function and unions, The Bitwise   operators.

Data Structures:
Introduction to Data Structures: Array: Program Analysis, Arrays, Array Declaration, Storage of arrays in Main memory, sparse arrays.

Lists: BasicTerminology,Staticimplementationoflists,Pointerimplementationoflists,Doubly linkedlists,circularlinkedlist,StorageAllocation,StoragePools,GarbageCollection,Fragment ation, Relocation andCompaction.
Stacks and Queues: Defining stack and Queue, stack operations and Implementations, stack Applications, Queues: Operations and implementation, Queue Application, priority Queues.
Graphs: Defining graph, Basic, Terminology, Graph Representation, Graph traversal (DFS, BFS), shortest path problem, Minimum spanningtree.
Trees and File Organization
Trees: BasicTerminology,Binary,trees,TraversalsofaBinarytree,BinarysearchTrees(BST).
AVL-Tree and B-Tree: Height Balanced tree, Building Height Balanced tree, B-Tree ,B-Tree of order5.
Files: Terminology, File organization, sequential files, Direct, File organization, Indexed Sequential file organization.

Searching and Sorting Techniques:

Searching Techniques: Sequential search, Binary Search,

Sorting Techniques-I: Internal Sort (insertion Sort, Bubble Sort, Quick Sort, way merge sort Heap sort), Sorting on Several keys.

SortingTechniques-II: Datastorage(MagneticTapes,Disks),sortingwithDisks,k-waymerging, Buffering, Sorting, withtapes.

BCA-1.3 (Basic Mathematics)

Elements of Differential Calculus

Real Numbers and Functions: Basic properties of R, Absolute value, intervals on the real line, Functions, new Functions from OLD, Types of Functions. Units and continuity - Basic propertiesofR.continuity.Differentiation-Thederivativeofafunction,Algebraofderivatives, continuity versus Derivability. Derivatives of Trigonometric Functions - Derivatives ofinverse functions,derivativesofinverseTrigonometricFunctions,useofTransformations.Derivativesof some standard functions - Exponential functions, Derivatives of Logarithmic functions, HyperbolicFunctionsMethodsofDifferentiation.

Drawing Curves

Higher Order Derivatives: Second and third order derivatives, nth order derivatives, Leibniz Theorem, Taylor's series and Maclaurin's series The Ups and Downs : Maxima-Minima of functions, Mean value theorems (Rolle's Theorem, Lagrange's Mean value theorem), sufficient conditions for the existence of Extreme points.

Geometricalpropertiesofcurves: EquationsofTangentsandNormals,Angleofintersection of Two curves, singular points,asymptotes.

Curve Tracing: Graphing a function and curve tracing tracing a curve: Cartesian Equation, Parametric Equation, Polar Equation.

Integral Calculus

Deftnite Integral: Preliminaries, Definite integral, fundamental theorem of calculus.

Methods of Integrtion: Basic Definitions, Integration by Substitution, Integration by Parts. **Reduction Formulas:**Integrals involving Trigonometric function, Integrals involving productions of trigonometric functions, Hyperbolic,Functions.

Integration of Rational and Irrational functions: Integrations of Rational Trigonometric functions, Irrational Functions.

Applications of Calculus

Applications of Differential Calculus: Monotonic functions Inequalities, Approximate values.

Area under a curve: Cartesian equation, polar form parametric form, Numerical integration, (Trapezoidal,Simpson's).ApplicationsofIntegralCalculus-Lengthofaplanecurve,volume ofasolidofRevolution,AreaofSurfaceofRevolution.

Solutions of Polynomial Equation

Sets: Set, subsets, venn diagrams, operations on sets, laws Relating operations, Cartesian product. Complex number's - Geometrical Representation, Aalgebraic operations, De Moivre's Theorem.

Cubic and Biquadratic Equations: Linear equations, Quadratic Equations CubicEquations,
BiquadraticEquations,Ferrari'ssolution,DescartessolutionRootsandtheirRelationwithcoefficients.

Equations and Inequalities

Systems of Linear Equations: Linear systems, solving By substitution solving by elimination.

Cramer's Rule: Matrix, Determinants, Cramer'sRule

Inequalities: Inequalities known to the Ancients, Cauchy Schwarz Inequality weierstrass' Inequalities, Tehebychev's Inequalities.

Conics

Preliminaries in plane Geometry: Equations of a straight line, symmetry, change of Axes, Polar Coordinates.

The Standard Conics: Focus Directrix Property, Parabola, Ellipse, Hyperbola, Polar Equation of Conics.

General Theory of Conics: General Second Degree Equation, Central and Non Central Conics, Tracing a Conic, Tangents, Intersection of Conics. The Sphere Cone and Cylinder
Preliminaries in Three Dimensional Geometry: Points, Planes, The Sphere - Equations of a sphere, tangent lines and planes, Intersection of Spheres.

Cones and Cylinders: Cones, Tangent planes cylinders. Conicaids

General Theory of Conicoids: Conicoid, change of Axes, Reduction to standard form.
Central Conicoids: A conicoids centre, classification of Central Conicoids, Ellipsoid, Hyperboloidofonesheet,Hyperboloidoftwosheets,IntersectionwithALineorPlane.
Paraboloids: Standard Equations of a Paraboloid, Tracing, Paraboloids, Intersection with a line or a plane.

BCA-1.5 (Database Management Systems)

Introductory Concepts of Data Base Management Systems
Basic Concepts: Introduction, Traditional file Oriented approach, Motivation for database approach, database basics, three views of data, The three level Architecture of DBMS Mapping between different levels database Management System facilities, DDL, DML, Elementsof a database Management System (DML Pre Compiler, DDL Compiler, File Manager, Database Manager, query Processor, database Administrator, Data dictionary) , Advantages and disadvantages of database managementsystem.
Data base Models and its Implementation: Introduction, File Management System Entity, Relationship (E-R) Model, The hierarchical model, DBTG set, the network model, The Relational model, Advantages and Disadvantages of Relational Approach, Difference between Relational and othermodels.
FileOrganizationforConventionalDBMS: Introduction,FileOrganization,Sequentialfile organization,Index-
sequentialfileorganization(TypesofIndexes,StructureofIndexSequential Files, VSAM, Implementation of Indexing through Tree- Structure), Direct file organization, Multi key file Organization (Need for the multiple Access path, multicost , File organization, Invertedfileorganization,cellularPartitions,comparisonandTradeoffintheDesignofMultikey file).
Management Considerations: Introduction, Organizational Resistance to DBMS Tools (Political observation, Information transparency, Fear of future potential, Reasons for Success), Conversion from An Old system to a new system, Evaluation of a DBMS, Administration of a database Management System.
Enterprise Wide Information System of the Times of India: Group (A Case Study) Introduction, organization and the operating environment unique nature of the Business, Information System goals and how to achieve the Goal, The Response System and Respnet Choices, Benefits.

RDBMS and DBMS

Relational Model: Concepts, Formal Definition of a Relation, the Codd, Commandments, Relational Algebra, Relational Completeness.

Normalization: Functional dependency, Anomalies in a database, Properties of Normalized Relations, 1st NF, 2nd NF, 3rd NF, BCNF, Fifth Normal form examples of Database Design.

Structured Query Language: Categories of SRL Commands Data Definition, DataManipulation ,views.

Distributed Databases: Structure of Distributed database Trade-OFFS in distributing the database, Design of Distributed Databases.

Emerging Trends in DBMS

Introduction to object oriented Database Management System: Next Generation database System, New database applications, object oriented database Management system, PromisesandAdvantagesofobjectorientedDatabaseMgt.system,DifferencebetweenRDBMS and OODBMS, Alternative object oriented Databasestrategies.

Introduction to client/Server Database: Evaluation of client/Server, Emergence of client server Architecture, the client/server Computing, the critical products, Developing on Application, SQL (DDL, DML), Client/Server. Where to Next?

Introduction to Knowledge Databases: Definition and Importance of knowledge, Knowledgebasesystem,Differencebetweenaknowledgebasesystemandadatabase system,kn owledge RepresentationSchemes.

BCA-1.6 (RDBMS)

RDBMS Design

RDBMS Terminology: Introduction, Database, Database management system, Instances and Schemas, Traditional File Oriented Approach, Benefits of Conventional or Centralized DBMS, Data Independence, Data Dictionary, Database Security, Domain Definition, A Relation, Relational data integrity, Candidate keys, primary key, Foreign keys, Referential Integrity, Candidate keys and Nulls, Data dictionary checklist.

Overview of Logical Database Design: Introduction, The Steps of Database design, Conceptual Design, Schema Refinement, Physical database Design and Tuning, ER Model, ER Model basics (Entity, Entity type and Entity set), Attributes (Attribute, key Attributes in Entity types, Composite vs. Simple attributes, Single vs. Multivalued Attributes, Derived vs. Stored Attributes, Null values, value sets of Attributes, Relationship, Degree of Relationship type, Structural Constraints, weak entities, Components of an E-R Diagram, ER Diagram Developmentexamples.

Overview of Normalization: Introduction, Redundancy and associated problems, Role of Normalization, Single valued dependencies, single valued normalizations, (1NF, 2NF, 3NF,BC NF), Desirable properties of decompositions (Attribute Preservation, Lossless-Join Decomposition,DependencyPreservation,LackofRedundancy,DerivingBCNF),Multivalue ddependencies, Multivalued Normalization – Fourth Normal Form, The fifth Normal form, Rules of data Normalization.

Practical on RDBMS: Introduction, DBMS and file oriented approach, Relational Databases and Integrity Constraints Entity- Relationship diagram, Functional dependency and Normalization , Normalization Structured Query Language (SQL), Microsoft-Access, views and Security using SQL.

RDBMS Lab: Introduction to MSAccess

Introducing Microsoft Access: Introduction, DBMS, Microsoft Access database, tables and Queries, forms and Reports,

Microsoft Access Basics: Introduction, Starting and Quilting Microsoft Access, Opening a database, The database window, objects of the Access database.

Working with database: Introduction, creating a Microsoft Access database, Creating objects, set toolbars to your working style.

Creating a table: Introduction, Plan fields and data types, create a table, set field properties, save and close a table, Add and save records, Edit records and close a table, Modify fields in a table, Modify Columns and rows in datasheet, Attach validation rule to a field.

Finding Data: Introduction, Find a value, find and replace, create and apply a filter, specify criteria, sort Records.

Creating a Qurey: Create a Query, The Query Window, Join tables, select fields, specify criteria sort Records, Calculate Totals, Modify a Query, Save aQuery.

Creating a form: Introduction, Create a form with a form wizard, view records in a form, Add, Delete and save Records, Save and close a form.

Customizing your form: Introduction, Change a form's design select and Resize controls, Move and Delete Controls, Change Fonts, Size and color of text.

Showing data from more than one table on a form: Introduction, create a form that contains a sub form, use a Query to include fields from more than one table.

SCreating Reports and mailing labels: Introduction, Use Reports to present data, create a Report, preview, print and save a Report, A Report in design view, create and print mailing labels.

BCA-1.7 (Basic Electronics)

- ElectronEmission

- VacuumTubes

- Vaccum TubeRectifiers

- Vacuum TubeAmplifiers

- Gas-FilledTubes

- AtomicStructure

- SemiconductorPhysics

- SemiconductorDiode

- Transistors

- TransistorBiasing

- Single Stage Transistor Amplifiers
- Multi Stage TransistorAmplifiers

- Transistor Audio PowerAmplifiers

- Amplifiers With NegativeFeedback

- SinusoidalOscillators

- Transistor TunedAmplifiers

- Modulation AndDemodulation

- Regulated D.C. PowerSupply

- Solid State SwitchingCircuits

- Field EffectTransistors

- Silicon ControlledRectifier

- ElectronicInstruments

- IntegratedCircuits

- HybridParameters   • DigitalElectronics

Reference Book: Basic Electronics
By V.K Mehta (S Chand Publication)

BCA-1.9 (C++ and Object Oriented Programming)

An Introduction to Object Oriented Programming
Object Oriented Programming: OOP Paradigm, the soul of OOP, OOP characteristics, Advantages of OOP, Applications of object Oriented Programming (System software, DBMS, Applications of OODBMS, Advantages and Disadvantages of OODBMS), The Object Orientation, OO Languages, Advantages of C++.

Object Oriented Programming System: What is OOPS?, Class, Inheritance, Abstraction (Procedural language, Object-oriented language), Mechanisms of Abstraction, Encapsulation and information hiding, Polymorphism, overloading,

Advancedconcepts: Dynamism(DynamicTyping,DynamicBinding,LateBinding,Dynamic Loading, Structuring programs, Reusability, Organizing Object-oriented Projects (Large scale

designing,SeparateInterfaceandImplementation,Modularizing,SimpleInterface,Dynamicde cisions,InheritanceofGenericCode,Reuseoftestedcode.

IntroductiontoObjectOrientedLanguages: Objective-C,Featuresofobjective-C,Python, Features of Python, C # (C SHAR), Features of C#, Eiffel, Modula-3, Features of modula-3, Small talk, object REXX, Java, Features of Java(Object Oriented, Distributed, Interpreted, Robust, Secure, Architecturally neutral, Portable High performance, Dynamic) , Beta various object oriented programming languages Comparativechart.

An Introduction to Unifted Modelling Language (UML): UML (Goals, History, use), Definition, UML Diagrams (Use case, class, interaction diagrams), State diagrams, ActivityDiagrams, Physicaldiagrams.

C++ — An Introduction
Overview of C++: Programming Paradigms (Procedural Programming, Modular Programming, Data Abstraction, Object Oriented Programming), Concepts of C++ functions and files. **Classes and Objects:** Definition and Declaration of a class, Scope Resolution   Operation, PrivateandPublicmemberfunctions,CreatingObjects,Accessingclassdatamembersandmemb er functions, Arrays of objects, Objects as FunctionArguments.

Operator overloading: Operator Functions, large objects, Assignment and initialization, Function Call, Increment, Decrement Operator, Friends.

Inheritance-Extendingclasses: Conceptofinheritance,BaseclassandDerivedclass,visibility Modes, Single inheritance Multiple Inheritance, Nested classes, virtualfunctions.

Streams and Templates: Output, Input, Files Exception, handling. and streams, Templates,

BCA-1.10 (Multimedia)

Introduction to Multimedia and Its Applications

An Overview of Multimedia: The Concept, Hardware for Multimedia Computer Software forMultimedia,ComponentsofMultimedia,Multimedia–Design,productionandDistribution. **Applications of Multimedia:** Application Areas for Multimedia, Publishing Industry and Multimedia, Communication Technology and Multimedia Services, Multimedia in Business, Multimedia Pedagogues: Interactive systems for teaching and learning, Concepts for Distributed Learning Environment, A Medical Application: Mednet – A Medical Collaboration and Consultation system.

Multimedia Authoring Tools: Multimedia Development tools, Features of Authoring Software, Authoring Tools, Quick Time, Hypertext, Applications of Hypertext (Computer Application, Business Application, Educational Application, Entertainment and Leisure Applications, Elements of Hypertext (Nodes, Links, Annotations, Buttons, Editors, Browsers, Trails, Built-in Programming Languages).
Multimedia Development – Issues and Suggestions: Learning Interface Design, Planning the Multimedia Programme/Application, Developing Tips of Multimedia BuildingBlocks, MultimediaAuthoring.

BCA-1.11 (System Analysis And Design)

System Analysis

Overview of System Analysis and Design: System, Systems study, Systems analysis and systems approach, characteristics of a system, Elements of systems analysis, types of systems, System Development life cycle, Software Crisis (Programmer's point of view, user's point of view), Role of a systemsanalyst.
Project Selection: System projects, sources of Project requests, Managing Project Review andselection,Preliminaryinvestigation,Problemsclassificationsanddefinitions.
Feasibility Study: Preliminary study, different types of feasibility (Technical, Operational, Economic, Social, Management, Legal and Time feasibility), Investigative study, cost/ Benefit analysis, Fact Findings (interviewing questionnaires, observing the current system, Determination of DFD, New System.
System Requirement Speciftcations and analysis: DFD, data dictionaries, HIPO (VTOC,IPO), decision tables and decision trees, warnier-ORR diagrams, NASSI-SHNEIDERMANN CHARTS **System Design**

Structured System Design: System Design Considerations, Design, Methodologies, Structured Design, Modularization, Design Process, System Specifications, Prototype Design.
Input Design and control: Processing Transaction data, Elements of input data, Input Media andDevices,InputMediaandDevices,InputDesignGuidelines,InputverificationandControl, DataDictionaries,Howtolayoutterminalscreen,MajorconcernsRegardingCRT-InputScreen Design.
Output System Design: Types of output, output Devices, output Design Consideration, Design of output Reports Designing Screen output, Menu design, Form Design and Control, Computer Graphics.
File and Data Base Design: Selecting data storage Media Types of File (Master, Transaction, Table, Report Backup, Archival, Dump, Library), File organization, File Design, Data base Design, Types of database coding system, Types of Code (Classification, Function, Card, Sequence, Significant digit , Subset code, Mnemonic code, Acronym).

System Development and Implementation

System Development: Task of System Development, Prototype installation Hardware and Softwareselectionandperformance,BenchmarkTesting,Preparingsoftwaredevelopmentcycle, softwarespecificationlanguageselectioncriteria.

System Control and Quality Assurance: Quality Assurance in Software life, cycle, Levels of Quality Assurance, Design objectives, Reliability and maintenance, Maintenance issues, Maintainable Designs, Testing practice and plans, Levels of tests, special sstes tests, Designing test data, system control, AuditTrial.

Documentation: Characteristics of a good documentation, types Software Design and documentation tools, need for documentation, Format for preparing documentation Package.

System Implementation: Training of Personnel involved with system, Training Methods, Conversion Methods, Review plan, System Maintenance, Hardware, Acquisitions, criteria for vendor's selection, service Bureaux.

Management Information System

Introduction to MIS: Definition, Historic Development, Typical Systems,

TheTechnologyComponent: OverviewofcomputingTechnology,OverviewofCommunication Technology, Database Technology, Decision Support Systems, knowledge Based systems.

TheOrganizationalImpactofMIS: InformationasaResource,InformationforCompetitive Advantage,Organization,InformationandDecision,MISasaprofession.

Building Management Information Systems: System Analysis, Techniques of Systems Analysis.

CaseStudies: Case(A)InformationSystemPlanning,Case(B)Preparingforsystemsanalysis, Case(C)SystemsAnalysisCompletion,Case(D)SystemDesignProposal,Case(E)Evaluation and selection of Systems Case (F) Implementation plan andActivities.

EmergingTrends

The Analyst As A Professional: Attributes of a good analyst, Organizational issues, The Systems Analyst and law.

Human Computer Interaction: The What, Why, When and where of Human Computer Interaction, Communicating with Computers, Ergonomics, Human problems in the Automated Office, Designing Human Machine Systems.

Introduction to Multimedia: Multimedia – The Concept, Design, Production and Distribu tion,ComponentsofMultimedia,SoftwareandHardwareforMultimedia.

BCA-1.13 (Computer Networks)

An Introduction to Computer Networks

Network, Classiftcation and Reference Models: Introduction, Network, Network Goals/ Motivation, Applications of Networks, Types of network, Reference Model (OSI, TCP) IEEE standards for LAN.

Data transmission and Multiplexing: Introduction, Transmission, Terminology, Timedomain Concepts, Frequency domain Concepts, Relationship between Data Rate and Bandwidth, Analog and digital data transmission, transmission media, Multiplexing.

Medium Access Control and D.L.L.: Introduction, D.L.L., Medium Access Control Sub- layer (Contention based media access protocols, polling based MAC protocols, IEEE standard

802.3 and Ethernets, IEEE standard 802.4 Token bus, IEEE standard 802.5 Token Ring.
Network, Transport (TCP/IP) And Application layer: Introduction, Network layer (Routing Algorithms, Shortest path routing, Flooding), Congestion Control Algorithms, Com- parison of virtual circuit and datagram subnets, Internetworking (Repeaters, Bridges, Routers), Transport layer (Transport service and Mechanism, Types of Service/Quality of Service), Transport Control Mechanism (Addressing, Flow Control and buffering , Multiplexing, Connection establishment and Management , Crash Recovery), TCP/UDP, Application layer (The domain name system (DNS), TCP/IP Internet Domain Name, Electronic Mail, www, Mail-based Applications), Remote procedure Call (RPC), File transfer protocol (FTP),   Telnet.
Network Devices and Technology Network Devices –I: Introduction, Network devices (Repeaters, Bridges, Switches, Hubs).

Network Devices-II: Introduction, Network devices (Routers, Comparison of Bridges and Routers, Gateways, Modem).
Integrated Services Digital Network (ISDN): Introduction, Baseband and Broadband Communication, ISDN Services, Advantages of ISDN,. ISDN applications (Internet Access, Telephony, Telecommunicating, Video conferencing, Education, Large-Scale file transfers).
Asynchronous Transfer Mode (ATM): Introduction, Switching Techniques (Circuit switching, Packet Switching, Multirate Circuit Switching, Frame Relay, Cell Relay), How compatible
isATMasTechnology?,ATMlayeredArchitectureinComparisonwithOSIModel,HowATM protocol works?, The ATM Network, The ATM CELL, ATM classes of services (ATM Service classes, ATM Technical Parameters), ATM, Traffic Control (Network Resource Management, Connection Admission Control, (Network Resource Management, Connection Admission Control, Usage Parameter Control and Network Parameter Control,   Priority   Control,   Congestion Control),BenefitsofATM,ATMApplications(ATMServices,ATMworkgroupandCampusnet works,ATMenterprisenetworkconsolidation,multimediavirtualprivatenetworksandmanage d services, frame relay backbones, Internet backbones, Residential broadband networks, Carrier infrastructures for the telephone and private linenetworks).

BCA-1.14 (Operating Systems)

Introduction: OperatingSystem,Generationofoperatingsystems,Processors,Memory,Disks, Tapes,I/ODevices,Buses,MainframeOperatingSystems,ServerOperatingSystemsMultiproc essor Operating Systems, Real time, Operating systems, smart card operatingsystems.
Operating System Structure: Monolithic systems, Layered systems, Microkernels, client, Server Model, Virtual Machines.

Processes and Threads: The process Model, process creation, Process Termination Process States Implementation of Processes, Thread usage, The classical thread Model, Hybrid Implementations, Interprocess Communication, Race Conditions, Critical Regions, Mutual Exclusion with busy waiting, sleep and wakeup, semaphores,
MemoryManagement: TheNotationofanAddressSpace,Swappingvirtualmemory,Paging Pagelabels,speedinguppaging,pageReplacementAlgorithms,TheoptimalPageReplacement Algorithm,the(FIFO)Page,ReplacementAlgorithm,Thesecondchancepage Replacement

Algorithm, The clock Page Replacement Algorithm, Design issues for Paging systems, Implementation Issues, Segmentation

Deadlocks: Resources,TheOSTRICHAlgorithm,Deadlock,Avoidance,Deadlockprevention, Deadlock Detection andRecovery.

Security: Basics of Cryptography, protection Mechanisms, Authentication, Malware, Defenses.

Case Study 1: LINUX

Case Study 2: WINDOWS VISTA

BCA-1.15 (Windows Programming)

Components of windows Programming and Visual   Basic

Visual Basic : Introduction: Start and Exit visual basic, V.B. Interface, Debug, Window, print command, V.B. ArithmeticOperators.

Variables   and Functions: Variables,variablenames,variabletypes,Rangeofthevariablevalues,functions.

Building A Project & Customizing Forms: About Project, Form, Form properties, Form tools, Form Events.

VisualBasicControls: Control,CustomControl,Controlsinaform,FunctionsandProcedures-Form, Standard and class Module, Sub procedure, DO-event Functions, ControlArrays.

Accessing Database : Using Data Manager, Creating a database, Creating a New Table, Attaching a table, changing Design of an existing table, Creating Indexes, working with data. Creating form with data controls - Data controls, Data Aware Control, Creating a form using Data Controls, Manipulating data, creating the menu Bar, Displaying a menu item code.

Object Linking and Embedding : Basics of OLE, the OLE Icon, Terms used in OLE, OLE Automation, using OLE Control popup-Menu, Creating OLE object at Design time Creating part of an OLE object, Testing Embedding/Linking.

Windows Programming Using visual Basic 6.0

Introduction: Starting An Era of visual software Development, RAD Tools, Basic interface component, Creating and linking object through Basic Programming,Activity.

Advanced Features of Visual Basic 6.0 : Identification of some Advanced features of visual Basic 6.0 Employment of Features, Simple Animation using Active X, Drag and Drop,Linking toDatabase.

Active X and Windows API: Creating Active X DLLs, Using windows API in visual Basic IDE.

BCA-1.17 (Software Engineering)

Software Engineering Concepts

Introduction to Software product, Component & Characteristics Engineering: Software product, Components and characteristics, Software Engineering phases, Documentationof the Software product, Software Process and models (Software life cycle, Requirementsanalysis and specification, Design and Specification, Coding and moduletesting).

Software Process Management: Software process management, Human Resource Management (Software process, Team leaders, Problem Solving, Influence and Team Building), The Softwareteam(DemocraticDecentralized(DD),ControlledDecentralized(CD),ControlledCe ntralized (CC), Organization, Information and Decision, Problem identification, Software Crisis, Role of asystemAnalyst.

Project planning and Control: Project scheduling, outsourcing. Project standards, Project **Risk Management Concepts:** Introduction and Risk Management Concepts, Technical Planning, Benchmark Testing.

Software Quality Concepts and Case Tools:

SoftwarePerformance: CustomerFriendliness,SoftwareReliability,SoftwareReviews,Soft ware Upgradation, Software tools, and environment, Software libraries and toolkits, Software Modules,ReapplicationofSoftwareModules,Developmenttools(CodeGenerators,Debugger s). **Quality Concepts:** Important Qualities of Software product and process (Correctness, Reliability, Robustness, Verifiability, Maintainability, Reusability, Portability, Data Abstraction, Modularity). Principles of Software Engineering (High quality software is possible, Give products to customers Early, Determine the Problem before writing the Requirements, Evaluate Design Alternatives, Use an Appropriate Process Model, Minimize Intellectual Distance, Good Management is more Important than Good Technology, People are the key to success, Follow with care, Takeresponsibility).

Software Methodology: An object Oriented Concepts The Evolving Role of Software, An industry Perspective, Structured Methodologies, Major influencing Factors (Evaluation of End user computing, Emergence of CASE Tools, use of Prototyping and 4 GL Tools, Relational Databases),usingtheMethodology,ChoosingtheRightMethodology,Implementingamethodo logy, Current Generation of Software Development tools, 4 GL Considerations in Application Development (Problems in Application Development, Impact of AGLs, Limitation of 4GLs, LINC),

Case Tools: Introduction,Softwarecrisis,WhatiswrongwithcurrentDevelopmentMethods?, Software and its increasing Cost, Software Errors and their Impact, An Engineering Approach to Software, why case fails?, Case tools (Generation of CASE tools, Categories of Case tools (Generation of CASE tools, Deft Case tools, The Deft CASE system, The Deft way (DFDs, ERDs,PSPs),FactorsAffectingSoftwareDevelopment,ThebenefitsofusingCASE.

BCA-1.18 (System Software)

Introduction to System Software

Programming Concepts and Software Tools: Introduction to Programming Language Concepts: Algorithm, Flowcharting, Problem and its Algorithm, Concept of a Programming Language, Categories of Languages, Elements of a Programming language.

Introduction to Assembler: Advocates of a translator, types of translators, Assembler implementation, Macro processor, Loaders.

Introduction to Compiler writing: Compiler, Approaches to compiler development, compiler Designing Phases, Software tools.

Graphical user interface : Graphical user interface, Evolution of the human and Machine

interaction, Common Graphical user interface terms, functionality of graphical user interfaces, A look at some graphical user interfaces.

Introduction to a text editor and debugging system: Introduction to a text editor, overview of the Editing process, Types of Editors and user interface, Editor structure, Interactivedebuggingsystems,DebuggingFunctionsandCapabilities,Relationshipwithotherp artsof the system, user interfacecriteria.

Fundamentals of operating system

Introduction to operating system: Operating System, Evolution of operating systems,serial processing, Batch processing, Multiprogramming, types of operating System, Batch Operating system Multiprogramming Operating system, Network operating system, Distributed Operating System, Operating System Structure, Layered Structure Approach, Kernel Approach, Virtual Machine, Client Server Model, Future Operating Systemtrends.

Process Management: Process concept Processor scheduling, Types of Schedulers, Scheduling and performance Criteria, Scheduling algorithms, Interprocess Communications and synchronization, Basic concepts of concurrency, Basic Concepts of Interprocess Communication and Synchronization, Mutual Exclusion, Semaphores, Hardware support for mutual Exclusion, MechanismforStructuredformofInterprocessCommunicationandsynchronization,Deadlock s, System model, Deadlock Characterization andModelling.

Memory Management: Introduction, single process monitor, Multiprogramming with Fixed partitions, Multiprogramming with dynamic partitions, Paging Address mapping in a paging system,HardwareSupportforPaging,AddressTranslationbyAssociativeMemory,Sharingand ProtectioninaPagingSystem,Segmentation,AddressMappinginaSegmentedSystem,Implem entation of segment tables, sharing and Protection in a Segmented System, Virtual memory,Advantages of virtual memory, Demand Paging Virtual memory managementpolicies.

File Management: Introduction, File concept, Directories, Disk organization, Disk Space Management methods, Linked List, Bit Map, Disk Allocation Methods, Contiguous Allocation, Non Contiguous Allocation, Disk Scheduling, FCFS, Shortest seek time-first scheduling, scan scheduling, File Protection, Passwords, Access Lists, Access Groups.

UNIX Operating System-I

Theoretical Concepts of UNIX operating System: Introduction, Basic features of unix operating system, UNIX system Architecture, File Structure processing Environment, CPU Scheduling, Memory Management, Swapping, Demand Paging, File System, Blocks and Fragment and Inodes, Directory Structure.

UNIX-GETTNG STARTED I: Introduction, Getting started, user Names and Groups, Logging in, Correcting Typing Mistakes, Format of UNIX commands, changing your Password, Characters with special Meaning, UNIX documentation, Files directories, Current Directory, Locking at the Directory Contents, Absolute and Relative, Pathnames, Some UNIX Directories and Files.

UNIX Getting Started II: Introduction, Looking at file contents, your own directories, file permissions, Basic operations on files, Links between Files, Changing permission modes, standard files, Standard Output, Standard Input, Standard Error, Filters and Pipelines, Processes, Finding out about Processes, stopping Background Processes.

TEXT Manipulation: Introduction, Inspecting files, file statistics, Searching for Patterns, Comparing Files, Operating on files, printing files, Rearranging Files, Sorting files, Splitting

files, Translating characters,

Editors: Introduction, General characteristics of vi , Starting up and quitting from vi , Adding
textandNavigation,changingText,SearchingforText,CopyingandMovingText,TheFeatures
of ex, The live editors Ex and Ed. starting up and Quitting, Addressing Lines, Looking at
Text, Adding Deleting and changing text, Searching for and replacing text, cut and paste
operations,
filesandMiscellaneousfeatures,TheStreamEditorSED,changingseveralfiledinSED, AWK.

UNIX operating System-II
User to user Communication: Introduction, Online communication. Communication,
Offline

Shell Programming: Introduction, Programming in the Bourne and the C- shell, wild
cards, simple shell programs, variables, Programming Constructs, interactive shell scripts,
advanced Features.

Programming Tools: Introduction, The UNIX C compiler, other tools (Lint- the –
Cverifier,
ProgramProfiles,Programlistings),CrossReferencesandProgramflow,MaintainingPrograms
, the source code control system (Initializing a file, Examining and Altering files,
Identification Keywords, MiscellaneousCommands).

System Administration: Introduction, System Administration – A Definition, Booting the
system, Maintaining user accounts, file systems and special files, Backups and Restoration.

BCA-1.19 (Computer Graphics)

INTRODUCTION TO COMPUTER GRAPHICS: What is Computer Graphics?,
Applications   Presentation   Graphics,   Painting   and   Drawing,   Photo   Editing,
ScientificVisualisation, Image Processing, Education, Training, Entertainment and CAD,
Simulations, Animation and Games, Graphics Hardware, Input and Output Devices,
DisplayDevices.

GRAPHIC PRIMITIVES: Points and Lines, Line Generation Algorithms, DDA
Algorithm,   BresenhamsLineGenerationAlgorithm,Circle-
GenerationAlgorithms,PropertiesofCircle,Mid Point Circle Generation Algorithm,
Polygon FillingAlgorithm,

VIEWING AND CLIPPING: Point Clipping, Line Clipping, Cohen Sutherland Line
Clippings,Cyrus-BeckLineClippingAlgorithm,PolygonClipping,Sutherland-
HodgmanAlgorithm, Windowing Transformations.

2-D and 3-D TRANSFORMATIONS: Basic Transformations, Translation, Rotation,
Scaling, Shearing, Composite Transformations, Rotation about a Point, Reflection about a
Line, Homogeneous Coordinate Systems, 3-D Transformations, Transformation for 3-1
Translations,   Transformationfor3-DRotation,Transformationfor3-
DScaling,Transformationfor3-DShearing,Transformationfor3-DReflection

VIEWING TRANSFORMATION: Projections, Parallel Projection, Orthographic and
Oblique Projections, Isometric Projections, Perspective Projections

CURVES AND SURFACES: Polygon Representation Methods, Polygon Surfaces,
Polygon
tables,PlaneEquation,PolygonMeshes,BezierCurvesandSurfaces,BezierCurves,Properties
ofBezierCurves,BezierSurfaces,SurfaceofRevolution

VISIBLE-SURFACE DETECTION: Visible-Surface Detection, Depth Buffer (or z-
buffer) Method, Scan-Line Method, Area-Subdivision Method

GRAPHIC PRIMITIVES:POLYGON RENDERING AND RAY TRACING METHODS Il-luminationModel,AmbientReflection,DiffuseReflection,SpecularReflection,Shading,Gour and ShadingorIntensityInterpolationScheme,PhongShadingorNormalVectorInterpolationShading, Ray Tracing, Basic Ray TracingAlgorithm

COMPUTER ANIMATION: Basics of Animation, Definition, Traditional Animation Techniques, Sequencing of Animation Design, Types of Animation Systems, Types of Animation, Simulating Accelerations, Computer Animation Tools, Hardware, Software, Applications for Computer Animation

MULTIMEDIA: Structure, Introduction, Objectives, Concept of Hypertext and Hypermedia, Definition of Hypertext, Definition of Hypermedia, Understanding the Concept, Hypertext/media and Human Memory, Linking, Multimedia Application, What is Multimedia, Importance of Multimedia, Role in Education and Training, Multimedia Entertainment, Multimedia Business, Video Conferencing and Virtual Reality, Electronic encyclopedia, Graphics, What is Graphics, Types of Graphic Images, Graphic Files Compression Formats, Uses for GIF and JPEG Files, AudioandVideo,SoundaniAudio,AnalogSoundVsDigitalSound,AudioFileFormats,Image Capture Formats, Digital Video, Need for Video Compression, Video File Formats, Multimedia Tools,BasicTools,TypesofBasicTools,AuthoringTools,TypesofAuthoringTools,Multimedia ToolFeatures

BCA-1.21 (Principle of Programming Language)

BLOCK -1: Programming Languages-1
Unit-1
Programming Languages Fundamental
Introduction, Programming Language Introduction, Importance of programming , languages , Brief history, Features
Unit-II
Language Translator
Introduction, Attributes of good programming language, Introduction to language translator
Unit-III
Data Types (Elementary And Structured)
Introduction, Binding and binding time, Elementary and structured data types, Specifications
Unit-IV
Representations And Implementation Of Numbers
Introduction, Representations and Implementation of numbers.

BLOCK -2: Programming Languages-2
Unit-I
Variable Size Data Structure
Introduction, Vectors , Arrays , Records , Character string, Variable size data structure, Sets
Unit-II
Encapsulation
Introduction, Input files, Encapsulation , Information hiding, Sub programs
Unit-III
Data Types & Sequence Control
Introduction, Type definition , Data Types , Abstract data types, Sequence control, Explicit and Implicit Sequence Control
Unit-IV
Exception Handlers & Co-Routines
Introduction, Subprogram sequence control, Recursive sub-programs , Exception and exception handlers, Co-routines , Scheduled subprograms

Unit-I
Task & Exception
Introduction, Tasks and Exceptions, Concurrency and Exceptions, Referencing Environments
Unit-II
Structures (Static, Dynamic & Block)
Introduction, Static and dynamic structures, block structure
Unit-III
Local Referencing Environments
Introduction, Local data & local referencing environments
Unit-IV
Scope of Shared Data
Introduction, Dynamic and Static scope of shared data, Types of Scopes

BLOCK -4: Programming Languages-4
Unit-I
Parameter & Their Transmission
Introduction, Block structure, Parameters and their transmission
Unit-II
Task And Shared Data Storage
Introduction, Task and shard data storage
Unit-III
System Controlled Storage Management
Introduction, Program and system controlled storage management, Storage Management Phases
Unit-IV
Storage Management
Introduction, Static based storage management, Stack based storage management, Fixed size heap storage management, Variable size heap storage management

BCA-1.22 (Computer Organization)

HardwareConcepts
Introduction and Data Representation: The won Neumann Architecture, Computers:Then and Now, Data Representation, Instruction Execution. Digital

Logic Circuits: Boolean Algebra, logic Gates, Combinational circuits, Adders, Sequential circuits, Interconnection Structures.
Memory Organization: Memory System, characteristics Terms for various memory Devices,
RAM,External/AuxiliaryMemory,HighSpeedMemories,CacheMemory,AssociativeMemories.
input/outputOrganization:input/outputModule,input/outputTechniques,DirectMemory Accessinput/outputprocessors,Externalinterface.(DMA),

CPU Organization
Instruction Sets: Instruction set characteristics, Addressing schemes, Instruction Format Design.
Register Organization and Micro Operations: Basic Structure of the CPU, An Advanced Structure, Register Organization, Micro Operations, Instruction Execution and Micro Operations.

ALUandControlUnitOrganization:ALUOrganization,ControlUnitOrganization,Functional Requirements of a Control unit structure of Control unit, Hardwired Control unit.

Microprogrammed Control Unit : MCU, Wilkes Control, The Microinstruction, Types of Microinstructions, Control Memory Organization, Microinstruction formats, A simple structure of Control Unit, Micro instruction (sequencing, Execution), Machine Startup.

Microprocessor and Assembly Language Programming

Microprocessor Architecture: Microcomputer Architecture, CPU Components, CPU Registers, Instruction set, Addressing Modes, Introduction to Motorola 68000 Microprocessors.

Introduction to Assembly Language: Assembly Fundamentals, input/output Services, language Program Development tools. language Assembly

Assembly Language Programming (Part-I): Simple assembly Programs (Data transfer, shift operations), Programming with loops and comparisons, Arithmetic and String Operations.   **AssemblyLanguageProgramming(Part–II):**Arrays,ModularProgramming,Interfacing Assembly language Routines to High level language programs,Interrupts

BCA-1.23 (Computer Oriented Numerical Techniques)

Computer Arithmetic and Solution of Non- Computer Arithmetic: Floating point Arithmetic and errors, Pitfalls in Computations (Loss of significant Digits, Instability of Algorithms).

Solution of Non-Linear Equations: Iterative Methods for Locating roots, chord Methods for finding roots (Regular-falsi Method, Newton Raphson Method, Second Method), Iterative Methods and convergence criteria.

Linear System of Algebraic Equations and Polynomial Interpolation:

Solution of Linear Algebraic Equations: Preliminaries, Direct Methods (Cramer's Rule, Gauss Elimination Method, Pivoting Strategies), Iterative Methods (The Jacobi Iterative Method, The Gass Seidal Iteration Method), Comparison of Direct and Iterative Methods.

Interpolation: Lagrange'sform,Interpolation,Polynomial,InverseInterpolation,GeneralError Term, Newtons Formula for forward, Backward and Divided. Differences, Interpolation at Equally spacedpoints.

BCA-E1 (Design and Analysis of Algorithm)

ELEMEMTARY ALGORITHMICS Structure : Introduction, Objectives, Example of an Algorithm, Problems and Instances, Characteristics of an Algorithm, Problems, AvailableTools & Algorithms, Building Blocks of Algorithms, Basic Actions & Instructions, Control Mechanisms and Control Structures, Procedure and Recursion, Outline of Algorithmic,Understanding the Problem, Analyzing the Problem, Capabilities of the Computer System, Approximate vs Exact Solution, Choice of Appropriate Data Structures, Choice of Appropriate Design Technology, Specification Methods for Algorithms, Proving Correctness of an Algorithm, Analyzingan Algorithm, Coding theAlgorithm

SOME PRE-REQUISITES AND ASYMPTOTIC BOUNDS Structure : Some Useful

Mathematical Functions & Notations, Functions & Notations, Modular Arithmetic/Mod Function, Mathematical Expectation, Principle of Mathematical Induction, Concept of Efficiency of anAlgorithm,WellKnownAsymptoticFunctions&Notations,EnumeratetheFiveWell-Known Approximation Functions and How These are Pronounced, The Notation O, The Notation ω, The θ Notation,The Notation o, The Notationw.

BASICSOFANALYSIS: Structure,Introduction,Objectives,AnalysisofAlgorithmsSimple Examples, Well Known Sorting Algorithms, Insertion Sort, Bubble Sort, Selection Sort, Shell Sort,HeapSort,DivideandConquerTechnique,MergeSort,QuickSort,ComparisonofSorting Algorithms, Best-Case and Worst-Case Analyses, Various Analyses of Algorithms, Worst-Case Analysis, Best-Case Analysis, Analysis of Non-Recursive Control Structures, Sequencing, For Construct, While and Repeat Constructs, Recursive Constructs, Solving Recurrences, Method of Forward Substitution, Solving Linear Second-Order Recurrences with Constant Coefficients, Average-Case and Amortized Analyses, Average-Case Analysis 3.8.2 Amortized Analysis **DIVIDE-AND-CONQUER:**Introduction,Objectives,GeneralIssuesinDivide-and-Conquer, Integer Multiplication, Binary Search, Sorting, Merge Sort, Quick Sort, Randomization Quicksort, Finding the Median, Matrix Multiplication, Exponentiation.

GRAPHALGORITHMS: Introduction,Objectives,Examples,NIM/MarienbadGame,Funct ionForComputingWinningNodes,TraversingTrees,Depth-FirstSearch,Breadth-FirstSearch, AlgorithmofBreadthFirstSearch,ModifiedAlgorithm,Best-FirstSearch&MinimaxPrinciple, TopologicalSort

DYNAMIC PROGRAMMING: Introduction, Objectives, The Problem of Making Change, ThePrincipleofOptimality,ChainedMatrixMultiplication,Matrix'MultiplicationUsingDyna micProgramming.

GREEDY TECHNIQUES

Introduction, Objectives, Some Examples, Formalization of Greedy Technique, Function Greedy- Structure (GV: set): Set, Minimum Spinning Tree, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.

MODELS FOR EXECUTING ALGORITHMS-I: FA: Regular Expressions, IntroductiontoDefiningofLanguages,KleeneClosureDefinition,FormalDefinitionofRegular Expressions,AlgebraofRegularExpressions,RegularLanguages,FiniteAutomata,Definition, Another Method to DescribeFA.

MODELS FOR EXECUTING ALGORITHMS-II: PDFA & CFG: Formal Language

& Grammar, Context Free Grammar (CFG), Pushdown Automata (PDA).

MODELS FOR EXECUTINGALGORITHMS-III:TM: PreludetoFormalDefinition, TuringMachine:FormalDefinitionandExamples,InstantaneousDescriptionandTransitionDia gram,InstantaneousDescription,TransitionDiagrams,SomeFormalDefinitions,Observations , Turing Machine as a Computer ofFunctions.

ALGORITHMICALLY UNSOLVABLE PROBLEMS: DecidableandUndecidableProblems,TheHaltingProblem,ReductiontoAnoth erUndecidableProblem,UndecidabilityofPost Correspondence Problem, Undecidable Problems for Context Free Languages, Other UndecidableProblems.

COMPLEXITY OF ALGORITHMS: Notations for the Growth Rates of Functions, The Constant Factor in Complexity Measure, Asymptotic Considerations, Well Known Asymptotic Growth Rate Notations, The Notation O, The Notation ω, The Notation θ, The Notation o,

The Notation w), Classification of Problems, Reduction, NP-Complete and NP-Hard Problems, Establishing NP-Completeness of Problems.

BCA-E2 (Theory Of Computation)

Finite Automata and Formal Languages

Finite Automata and Languages: Regular Expressions (Introduction to Defining of languages,KleeneclosureDefinition,FormalDefinitionofRegular,Expressions,AlgebraofRegular Expressions), Regular languages, Finite automata, Mealy and MooreMachines.

Non-Deterministic Finite Automata: Equivalence of NFA and DFA, Pumping Lemma,Closure properties (Regular Languages and Finite Automata), Equivalence of Regular expression and FiniteAutomata.

Non-Deterministic Finite Automata: Context Free Grammar: Grammar and its classification,Chomsky,ClassificationforGrammar,Contextfreegrammar,pushdownAutomata(PDA), Non-Contextfreelanguages,PumpingLemmaforcontextfreeLanguages,EquivalenceofCFG andPDA.

Turing Machine and Recursive Functions

Turing Machine: Prelude to formal definition, Instantaneous Description and transition diagrams, Turing Machines as Computer of functions, Modular Construction of Complex turing machines, Symbol Writing machines, Right/Left head moving machines.

Turing Machine Miscellany: Extensions –cum-Equivalents of Turing Machine, Universal Turing Machine (UTM), Languages Accepted/Decided by TM, The diagonal language and the universal language, Chomsky Hierarchy.

Recursive Function Theory: Recursive Function Theory Recursive Definitions, Partial, Total and Constant Functions, Primitive Recursive Functions, Intuitive Introduction to primitive recursion,PrimitiveRecursionisweakTechnique,TheTechniquesofunboundedminimilization, Partial Recursion andu-Recursion.

Complexity of Computability

Computability/Decidability: Decidable and undecidable problems, The halting, problem, Reduction to another undecidable problem, undecidability of post correspondence problem, undecidable problems for context free languages.

Computability/Decidability: Complexity Notations for Growth rates of functions (The ConstantFactorinComplexityMeasure,Asymptoticconsiderations,wellknownAsymptoticgrowth rateNotations,TheNotationO,TheθNotation,TheNotationω,TheNotationW,classification of problems, Reduction, NP-Complete and NP-Hard Problems, Establishing NP-Completeness ofproblems.

Computability/Decidability: Applications Applications of Finite Automata, Applications of RegularExpressions,ApplicationofContextfreegrammars(DefinitionofC-typesmalllanguage, Definition of Part of HTML), ACM Code of Ethics and ProfessionalConduct.

BCA-E3 (Data Mining)

- Introduction
- DataPreprocessing
- DataWarehouse and OLAP Technology: AnOverview
- Data Cube Computation and Data Generalization
- Mining Frequent Patterns, Associations, andCorrelations
- Classification andPrediction
- ClusterAnalysis
- Mining Stream, Time-Series, and SequenceData
- Graph Mining, Social NetworkAnalysis, and Multirelational DataMining
- Mining Object, Spatial, Multimedia, Text, and Web Data
- Applications and Trends in DataMining

Reference Book: Data mining: concepts and techniques
By Han, Jiawei, Micheline Kamber, and Jian Pei. (Morgan Caufmann Publication)

BCA-E4 (E-Commerce)

- Introduction to Electronic Commerce
- Electronic Commerce: Business Models
- Electronic Data Interchange Chapter
- Electronic Commerce: Architectural Framework
- Electronic Commerce: Network Infrastructure
- Electronic Commerce: Information Distribution and Messaging
- Electronic Commerce: Information Publishing Technology
- Electronic Commerce: Securing the Business on Internet
- Electronic Commerce: Securing Network Transaction
- Electronic Payment Systems
- Electronic Commerce: Influence on Marketing
- Electronic Commerce: Search Engines and Directory Services
- Internet Advertising
- Mobile Commerce: Introduction, Framework, and Models
- Agents in Electronic Commerce Printed Pages

BCA-E5 (Object Oriented Analysis and Design)

INTRODUCTION TO OBJECT ORIENTED MODELING: Introduction, Object Oriented Modeling, Basic Philosophy of Object Orientation,Characteristics Object Oriented Modeling,Class and Objects, Links and Association, Generalization and Inheritance, An Object Model, Benefits of OO Modeling, Introduction to OOA& Design Tools.

OBJECT ORIENTED ANALYSIS: Introduction, Objectives, Object Oriented Analysis, Problem Statement: An Example, Differences between Structured Analysis and Object OrientedAnalysis,AnalysisTechniquest,ObjectModeling,DynamicModeling,FunctionalModeling, Adding Operations, Analysis Iteration, Refining the Ratio Analysis, Restating the Requirements

USING UML: Introduction, Objectives, UML: Introduction, Object Modeling Notations: Basic Concepts, Structural Diagram, Class Diagram, Object Diagram, Component Diagram, Deployment Diagram, Behavioral Diagrams, Use Case Diagram, Interaction Diagram, Activity Diagram, Statechart Diagram, Modeling with Objects, Summary.

SYSTEMDESIGN: Introduction,Objectives,SystemDesign:AnObjectOrientedApproach, BreakingintoSubsystems,Concurrencyidentification,ManagementofaDataStore,Controlling Events Between Objects, Handling BoundaryConditions

OBJECT DESIGN: Introduction, Objectives, Object Design for Processing, Object Design Steps,ChoosingAlgorithms,SelectingDataStructure,DefiningInternalClassesandOperations, Assigning Responsibility for Operation, Design Optimization, implementation of Control, State as Location within a Program, State Machine Engine, Control as Concurrent Tasks,Adjustment ofInheritance,RearrangingClassesandOperations,AbstractingOutCommonBehavior,Design ofAssociations,AnalyzingAssociationTraversal,One-wayAssociations,Two-wayAssociations **ADVANCE OBJECT DESIGN:** Introduction, Objectives, Control awl its Implementation, Control as a Stake within Program, Control as a State Machine Engine, Control as Concurrent Task, Inheritance Adjustment, Association: Design, Object Representation, Design Optimization, DesignDocumentation.

OBJECT MODELING: Introduction, Objectives, Advanced Modeling Concepts, Aggregation, Abstract Class Multiple Inheritance, Generalization and Specialisation, Meta Data and Keys, Integrity Constraints, An Object Model

DYNAMIC MODELING: Introduction, Objectives, Events, State and State Diagram, ElementsofaStateDiagram,AdvancedConceptsinDynamicModeling,ConcurrencyADynamic Model.

FUNCTIONAL MODELING: Introduction, Objectives, Functional Models, Data Flow Diagrams, Features of a DFD, Processes, Data Flows, Actors, Data Stores, Constraints, Control Flows,DesignFlawsinDFD,ASampleFunctionalModel,RelationofFunctionaltoObjectand DynamicModel

IMPLEMENTATION STRATEGIES: Introduction, Objectives, Implementation Associations, Unidirectional Implementations, Optional Associations, One-to-One Associations, AssociationswithMultiplicity'Many',Bi-directionalImplementations,One-to-OneandOptional Associations,One-to-ManyAssociations,ImmutableAssociations,ImplementingAssociationsas Classes, Implementing Constraints, Implementing State Charts,Persistency.

OBJECT MAPPING WITH DATABASE: Introduction, Objectives, Relational Database

SchemaforObjectModes,GeneralDBMSConcepts,RelationalDBMSConcepts,RDBMSLogical Data Structure, Object Classes to Database Tables, Extended Three Schema Architecture
forObjectModels,TheuseofObjectIDs,MappingObjectClassestoTables,MappingAssociationstoTables,MappingBinaryAssociationstoTables,MappingMany-to-ManyAssociationto Tables,MappingTernaryAssociationstoTables,MappingGeneralizationstoTables,Interfacing toDatabases,

CASE STUDY: INVENTORY CONTROL SYSTEM: Introduction, Objectives, Class Diagram, Object Diagram, Generalization and Association Diagram, Collaboration Diagram, Activity Diagram and Events, Use Case Diagram, Deployment Diagram.

BCA-E6 (Java Programming)

Object Oriented Technology and Java

Object – Oriented Methodology-1: Paradigms of Programming languages, Evolution of 00 Methodology, Basic Concepts of OO Approach, Comparison of object oriented and procedure – oriented Approaches, Benefits of OOPS, Applications of OOPS.

Object – oriented Methodology -2: Classes and objects, Abstraction and Encapsulation, Inheritance, Method overriding and Polymorphism.

Java Language Basics: Introduction to Java, Primitive Data Type and Variables, Java Operators.

Expressions Statements and Arrays: Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump statements, Arrays.

Object oriented concepts and Exceptions Handling

Class and objects: Class Fundamentals, Introducing Methods, this Keyword, Using objects as Parameters, Method overloading, Garbage collection, the finalize ()Method.

Inheritance and Polymorphism: Inheritance Basics, Access, Multilevel, inheritance,Method overridingAbstractclasses,Polymorphism,FinalKeyword.

Packages and interfaces: Package, Accessibility of Packages, using Package members, Interfaces,Implementinginterfaces,interfaceandAbstractclasses,ExtendsandImplementstogether.

ExceptionsHandling: Exception,HandlingofException,TypesofExceptions,Throwing,Exceptions, writing Exceptionsubclasses.

Multithreading, I/O, and Strings Handling

Multithreaded Programming: Multithreading, The Main thread, JAVA Thread Model, Thread Priorities, Synchronization in JAVA, Inter thread Communication.

I/O In Java: I/O Basics, Streams and stream, Classes, the predefined streams, Reading from and writing to console, reading and writing files, the transient and volatile Modifiers, using instance of Native Methods.

Strings and Characters – : Fundamental of Characters and Strings, the String class, String operations, Data Conversion using value of () Methods, Strings Buffer and Methods.

Exploring Java I/O: Java I/O classes and interfaces, Stream classes, Text streams, Stream Tokenizer, Serialization, Buffered stream, print stream, Random Access file.

Graphics and user interfaces

Applets: The applet class, Applet architecture, An applet Skeleton: Initialization and Termination, Handling events, HTML Applet TAG.

Graphics and user interfaces: Graphics contests and Graphics objects, user interfacecomponents, Building user interface with AWT, Swing – Based GUI, Layouts and layouts and layout Manager,Container.

NetworkingFeatures: Socketoverview,Reservedpartsandproxyservers,InternetAddressing : Domain Naming Services (DNS), Java and The Net: URL, TCP/IP Sockets,Datagrams.

AdvanceJava: Javadatabaseconnectivity,anoverviewofRMIApplication,JavaServlets,Java Beans.

BCA-E7 (Network Programming)

- Introduction

- The Transport Layer: TCP andUDP

- SocketsIntroduction

- Elementary TCPSockets

- TCP Client-ServerExample

- I/O Multiplexing: The select and poll Functions

- SocketOptions

- Elementary UDPSockets

- Elementary Name and Address Conversions

- IPv4 and IPv6Interoperability

- Advanced Name and Address Conversions

- Daemon Processes and inetdSuperserver

- AdvancedI/OFunctions

- Unix DomainProtocols

- NonblockingI/O

- ioctlOperations

- RoutingSockets

- Broadcasting

- Multicasting

- Advanced UDPSockets

- Out-of-BandData

- Signal-Driven I/O

- Threads

- IPOptions

- RawSockets

- DatalinkAccess

- Client-Server DesignAlternatives

- XTI: TCPClients

- XTI: Name and Address Functions

- XTI: TCPServers

- XTI: UDP Clients andServers

- Streams

- XTIOptions

- XTI: AdditionalFunctions

Reference Book:
Unix Network Programming

By, W. Richard Stevens (Addison Wesley):

BCA-E8 (Mobile Computing)

- Mobile Communications: AnOverview

- Mobile Devices andSystems

- GSM and Other 2GArchitectures

- WirelessMediumaccessControl,CDMA, 3G and 4GCommunication

- Mobile IP networklayer

- Mobile TransportLayer

- Databases and MobileComputing

- Data Dissemination and Systems for Broadcasting

- DataSynchronizationinMobileComputingSystems

- Mobile Devices: Application Serversand Management

- Mobile Ad-hoc and Wireless Sensor Networks

- Mobile Wireless Short range Networks and MobileInternet

- Mobile Application Languages- XML, Java, J2ME, andJavaCard

- Mobile Application Development Platforms

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BCA-E9 (Web Technology)

- Web Essentials: Clients, Servers, andCommunication

- Markup Languages: XHTML1.0

- Style Sheets:CSS

- Client-Side Programming: The JavaScriptTMLanguage

- Host Objects: Browsers and theDOM

- Server-Side Programming: JavaServlets

- Representing Web Data:XML

- Separating Programming and Presentation: JSPTMTechnology

- Web Services: JAX-RPC, WSDL, XML Schema, andSOAP

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BCA-E10 (Client Server Technology)

- The BusinessOpportunity

- Advantages of Client/ServerComputing

- Components of Client/Server Applications—TheClient

- Components of Client/Server Applications—TheServer

- Components of Client/Server Applications—Connectivity

- Client/Server Systems Development—Software

- Client/Server Systems Development—Hardware

- Client/Server Systems Development—Service andSupport

- Client/Server Systems Development—Training

- The Future of Client/Server Computing

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BCA-E11 (Computer Architecture)

- Introduction to parallelprocessing

- Memory and input-outputsubsystems

- Principles of pipelining and vector processing

- Pipeline computers and vectorization methods

- Structures and algorithms for array processors
- SIMD computers and performance enhancement

- Multiprocessor architecture and programming

- Multiprocessing control andalgorithms

- Example multiprocessorsystems

- DataflowcomputersandVLSIcomputatio ns.

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BCA-E12 (Microprocessor and its Applications)

- Architecture and Pin Details of the 8085 Microprocessor

- Programming theMicroprocessor-I

- Programming theMicroprocessor-II

- ProgrammingExercises

- Interfacing Input and OutputDevices

- Interrupts
- Memory in A Microprocessor Based System

- ProgrammablePeripheralInterface8255

- Keyboard and DisplayInterface-8279

- Serial CommunicationInterface-8251

- Priority InterruptController-8259
  - Direct MemoryAccess-8257 Microprocessor Based Applications

  - Other 8 Bit Microprocessors

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