MJP Rohilkhand University, Bareilly

Faculty of Applied Sciences

B.Sc. (Computer Sciences)

Course Structure & Syllabi
W.E.F. 2001-2002

B.Sc. (Computer Science)

S. No.	Subject	Paper	Marks	Total
		I Year (all Subjects Compulsory)		
1.	Basic Science & Humanities	1.1 Effective Communication 1.2 Differential Calculus and Differential Equation 1.3 Number Theory; Complex Variables and 2-D	50 50 50	150
2.	Computer Application	2.1 Computer Fundamentals 2.2 Digital Logic and Computer Design 2.3 Basic Programming concepts using C	33 33 34	100
3.	Computer System Design and Maintenance	3.1 Basic Electronics 3.2 Computer & peripheral devices 3.3 Computer Architecture	33 33 34	100
	Practicals	Computer Application Lab (Based on 2.3) Computer Sys. Des. & Maint. Lab (Based on 3.1)	50 50	100
		Total		450
		II Year (All Subjects Compulsory)		
1.	Basic Science & Humanities	1.1 Technical English Writing 1.2 Abstract Algebra 1.3 Numerical Analysis	50 50 50	150
2.	Computer Application	2.1 Operating System 2.2 System Programming & Microprocessor 2.3 Data Structures using C++	33 33 34	100
3.	Computer System Design and Maintenance	3.1 GUI Design 3.2 Business Data Processing 3.3 Data Communication	33 33 34	100
	Practicals	Computer Application Lab(Based on 2.2 & 2.3) Computer Sys. Des. & Maint. Lab (Based on 3.1 &3.2)	50 50	100

		Total		450
		III Year (Any Two Subjects)		
1.	Basic Science & Humanities	1.1 India in 20th Century 1.2 Real Analysis 1.3 Matrices and Linear Programming	75 75 75	225
2.	Computer Applications	2.1 Introduction to Computer Graphics 2.2 System Analysis & Design 2.3 Design and Analysis of algorithm	50 50 50	150
3.	Computer System Design and Maintenance	3.1 Computer Networks 3.2 Introduction to Database 3.3 UNIX & Shell Programming	50 50 50	150
	Practicals	Computer Application Lab (Based on 2.1) Computer Sys. Des. & Maint. Lab (Based on 3.2 & 3.3)	75 75	150
		Total		450

B.Sc. (Computer Science)
I Year

1. **Basic Science & Humanities**
Effective Communication (50)
Differential Calculus and Differential Equation (50)
Number Theory, Complex Variables and 2-Dimension (50)

2. **Computer Applications**
    2.1 Computer Fundamentals (33)
    2.2 Digital Logic and Computer Design (33)
    2.3 Basic Programming concepts using (34)

3. **Computer System Design and Maintenance**
Basic Electronics (33)
Computer & peripheral device (33)
Computer Architecture (34)

   Practical

   Computer Application Lab (Based on Paper (2.3) (50)
   Computer System Design and Maintenance Lab (Based on Paper (3.1)(50)

Basic Science and Humanities

1.1 Effective Communication (50)

Unit I:
Comprehension:
   (a) The Text Prescribed for Detailed Study one Passage Followed by Question is to be Set
   (b) Comprehension of an Unseen Passage
Unit II:
Business Correspondence

Unit III:
Composition
Unit IV:
   (a) English Sounds (Constants, Vowels and Diphthongs) to be tested through Transcription of Monosyllabic Words
   (b) Word Stress

Unit V:
Text Based Essay Writing
References:
   1.   Living English Speech, W. Stannard Allen, Orient Langman
   2.   English Mado simple, Arthur Waldhorn D. and Aither Ziqer Heineman
   3.   English Language, Jill Talbot, Pengion

1.2 Differential Calculus and Differential Equation (50)

Unit I: Successive Differentiation:
Leibnitz's Theorem (Proof Also), nth differential for special values of 'X' Expansion of function of Maclaurins & Taylor's theorem (State and proof)

Unit II: Tangent and Normal:
Polar tangent, Normal, Sub tangent and subnormal, Differential coefficient of an are in Cartesian and Polar forms, indeterminate forms

Unit III:
Integration of Rational and Irrational Algebraic Fraction, Definite Integral, The integral as a limit of a sum, Summation of Series

Unit IV:
Differential Equation of the First Order and First Degree, Singular Solution

Unit V:
Linear Differential Equation with constant coefficient, Homogeneous Linear Equation, Simultaneous Linear Differential Equation with Constant Coefficient

References:

(1) Text Book on Differential Calculus By Gorakh Prasad Pothishala Private Ltd. Allahabad
(2)Text Book on Integral Calculus by Gorakh Prasad Pothishala Private Ltd. Allahabad

1.3 Number Theory Computer Variables and 2-D (50)

Unit I: Divisibility theory in integer:
The division Algorithm, The greatest Common Divisor, The Euclidean Algorithm, The Diophantine equation ax + by=c Relative prime integer, Gauss theorem, Fundamental Theorem of Arithmetic

Unit II: The theory of congruences, Basic property of congruence, Special divisibility test, linear congruences, far mat's theorem, Wilson's theorem

Unit III: Complex Numbers:
The real number system, Graphical representation of real numbers, Fundamental operation with complex numbers

Unit IV: De Moivere's theorem, Roots of complex numbers, Euler's formula, Polynomial equation, the nth root of unity, Dot and Cross product, Complex conjugate co-ordinate point sets

Unit V:
 2-D
Ellipse, Parabola, Hyperbola only simple cases (2-D)

References:
(1)Theory and Problems of Complex Variables by Mourray R. Spiegel   Publication: Me Graw-Hill Book Company
(2) Co-ordinate Geometry by S.L. Loney
    Publication: Macmillan and Co. Limited (London)
(3)Elementary Number Theory by David M. Burton
   Publication: Universal Books Stall (New Delhi)

Computer applications

2.1: (33) Computer Fundamentals

Unit 1:
Computer Basic:
Algorithm, A Simple Model of a Computer.
Number System & Data Representation:
Introduction to number System, Representation of Characters in computer, Representation of integers, representation of fractions, Hexadecimal
Representation of number, Conversions, BCD, ASCII

UNIT II:
Computer Memory:
Memory cell, memory organization, Read only memory, serial Access Memory,
Physical device used to construct memories, magnetic Hard Disk, Floppy Disk Drives, CD ROM, and Magnetic Tape Device.

Unit III:
Central Processing Unit:
Register, General Register organization, Stack organization, Register/Memory
Stack, Reverse Polish Notation Formats, instruction Formats, Addressing Modes.

Unit IV:
Operating System & Generation of computers:
Operating System- Batch OS/ multi Programming OS/ Time Sharing
OS/Personal Computer OS/ Generations of Computer/Classifications of
Computer Systems/ Parallel Computers

Unit V:
Applications of Computer System:
Education & Training, Medical, Business, Communications, Defense and in
Research areas

References:
Fundamental of Computer by V. Raja Raman, Prentice Hall of India
Computer Fundamentals by P.K. Sinha, B.P.B. Publications

2.2 Digital Logic and Computer Design (33)

Unit 1:
Boolean Algebra & Logic Design:
Basic Delineation, Axiomatic Deft of Boolean algebra, Theorems, Properties
Functions, Digital Logic Gates, IC Digital Logic Families. Simplifications of
Kmap (POS.SOP), Don't Care Conditions

Unit II:
Combinational Logic:
Design procedure, Adders, Sub tractors, Code Conversions, Analysis Procedure,
Multi Lever NAND/NOR circuits. Binary Parallel Adder, Decimal Adder,
Decimal Adder, Magnitude Comparators, Decoders, Multiplexers.

Unit II:
Sequential Logic:
Flip Flops, Triggers, Analysis of Clocked Sequential Circuits, State reduction
Excitation labels & Design Procedures, Design Counters Conversion of Flip
Flops

Unit IV:
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing
Sequences, Memory Unit, Examples of Ran

Unit V:
Inter Register Transfer, Micro Operation. Arithmetic, Logic & Shift Micro
Operations, Conditional Point Binary Data, Overflow, Arithmetic Shifts,
Decimal, Floating & Non numeric Data, Design of Simple Computer

References:
Digital Logic and Computer Design, Morris Mono, (Prentice Hall India Ltd.)
Computer System Architecture, Morris Mono, (Prentice Hall India Ltd.)

Computer System Design and Maintenance

3.1 Basic Electronics (33)

Unit 1: Electronics Components (Passive element) - working principle, symbols, types,
techmcal specification, Parameter value identification/measurement techniques; and
Application area for Resistor, inductors, capacitors, **RC, RL** circuits & concept of time
constant.
Transformer relays, switches, batteries.
Tasting & measuring Instrument-Block diagram, working principles and user 'guidelines for **CRO**,
millimeters, function generator.

Unit 2: Networking Theorem: Kirchofl's current & Voltage laws, maximum power transfer
theorems, superposition theorem, Thevencs's theorem, & Norton's theorem Series and parallel
LCR resonance circuits, low pass, high pass, band pass & band reject filters-Working principles,
symbols types, technical specification, parameter, value identification and application means for
Pn junction diodes, photodiode, LED, Zener diode, opto-isolator, clipping and clamping circuits.

Unit 3: BJTS-Characteristics, basic configurations biasing operating point, land line,
 Biastage for stabilization of operating point

Amplifiers Different terms used with amplifiers such as signal source, input, output voltage and
current gain decibel, input-output impedance, classification according to frequency response,
biasing point.

Unit 4: Operational Amplifier: Basic idea of an **OP-AMP** with black box concepts inverting & non-
inverting, summing and difference amplifier.
Comparator and liner integrator,
Oscillator and Multivibrators: Positive Feedback, Bark Hauser criteria, phase shift,
 Wein bridge and crystal oscillator,
Multivibrators-A stable, mono stable and bistable Multivibrators.

Unit 5: Power supply: Basic block diagrams of a power supply transformer, rectifier, filter,
regulator, bridge rectifier.
Regulated power supplies: Zener regulator, Series and shunt regulator, short circuit protection-
Switched mod power supply: (Operating Principle)

References:

1. BL. Thareja volume I & IV, Pub: Sultan Chand
2. Grob Basic electronics by Barnard Grob. Pub: Tata Me Hill
3. Op-Amps and linear integrator circuits by Ramakanth A. Gayakwad. Pub: Prentice Hall of India Ltd.

2.3 Programming in C (34)

Unit I
Historical development, Character set, Constants, variables, keywords, Identification, Data types (Basic and user defined). Instructions, Expressions and Operators, Qualifiers, Integer and Float Conversions, Type conversion, Operator precedence,

Unit II
Decision & loop Control Structures
1. If Statement
2. Nested If – else
3. Conditional Operators
4. l oops- While For, do while
5. Nesting of Loops
6. Break Statement, Continue Statement
7. Decision using Switch and go to

Unit III
Functions, Arrays and Strings
Functions Prototype, Function main, user defined and library functions, Recursion, Scope and Storage Classes, Call by Value and Call by Reference, Arrays (one dimensional and Two dimensional),
Introduction to String:-
Reading a Character, Writing a Character, Standard library String Functions,

Unit IV
Structure and Union:
Declaration and initialization of Structures, Nested Structures, Array of structure, Union,

Unit V
Pointers Dynamic Memory allocation, Pointer& Function, Pointers to pointer, Self Referential Structure Alias,
File Handing in c, Binary & Sequential files.

References:
1. Computer Fundamental, P. k. Sinha.
2. Programming With C, E. Balaguruswami, Tata Me Hill.
3. Let Us C , Yashwant Kanitkar , BPB Publications

3.3 Computer Architecture: (34)

Unit I
Basic computer Organization & Design, Instruction & Instruction Codes,
Timing & Control unit, Instruction Cycle, Registers/types of registers/general purpose & special Register/Index Registers, Register Transfer and micro
Operations Register Transfer Instruction, I/O & interrupts, Memory reference Instruction

Unit II
RICS-CISC / characteristics/Berkeley RISCI, Parallel Processing,
Pipelining, Arithmetic, pipeline, Instruction pipe line, **RICS** pipe line, vector Processing. Array processor.

Unit III
Computer Arithmetic
Addition and Subtraction, Multiplication Algorithm,
Division Algorithm, floating point Arithmetic Operation Decimal Arithmetic Unit, Decimal Arithmetic Operation,

Unit IV
Input Output Interface, Asynchronous Data Transfer, Modes of Transfer Priority Interrupt/Programmed I/O, Interrupt Initiated I/O Direct Memory Access **(DMA),** Input – Output Processor, Interrupt, Priority Interrupt,

Unit V
Overview of 8085 to Intel Pro Pentium Processors,
Assembly Language Assemblers, Level Instructions, Macros Use of Macros in IO Instruction, Program Loops, Programming arithmetic and Logic

References:
1. Computer System Architecture by Morris Momo. (Prentice Hall of India)
2. Computer Architecture & Organization by John phay.
3. Introduction to Micro Processors, Mathur A.P., (Tata Me Hill)

3.2 Computer Peripheral devices (33)

Unit I: Introduction to computer & Peripheral Devices: -
Simple mode of computer, characteristic of computer, problem solving using computer, CPU, I/O devices : Various Types, Characteristics Mechanisms (Monitors, Printer, Plotter, Keyboards, Mouse, Light pen, Graphics Tablet, Stylus)

Unit II: Computer Memory: -
Memory unit, Memory hierarchy, Main Memory /**RAM, ROM** (types), Auxiliary memory, Associative, Virtual, Cache memories, Cache controller,

Unit III: Storage Devices & Interfacing with O.S.:-
Storage devices-operation principle, physical construction formatting and partitioning Hard Disk, Operating System (concept) **DOS** / windows, Introduction, functions of **OS**, Time sharing, multiprogramming,
Multitasking

Unit IV: Instruction Level Parellism and Super scalar Processor:
Overview, Design Issues, **Pentium II, Power PC, MIPS R10000, Ultra SPARC-II, IA**-64/Merced, Parallel Organization:

Multi Processor Organization, Symmetric Multiprocessors,

Unit V:
Motherboards, (Intel 810, 815, 810e, 845, 850) Types, Slots Available, **SCSI** Hdd,
Ports- Serial, Parallel, USB

References:
1. Computer System Architecture by Morris Mono. (Prentice Hall India Ltd.)
2. Computer Organization & Architecture By William stalling Pearson Education
3. Manuals of Operating Systems

B.Sc. (Computer Science)

II Year

1. **Basic Science & Humanities**
Technical English Writing (50)
Abstract Algebra (50)
Numerical Analysis (50)

2. **Computer Application**
    2.1 Operating System (33)
    2.2 System Programming & Microprocessor (33)
    2.3 Data Structures using C++ (34)

3. **Computer System Design and Maintenance**
GUI Design (33)
Business Data Processing (33)
Data Communication (34)

Practical:
Computer Application Lab (Based on Paper (2.2) & (2.3) (50))
Computer System Design and Maintenance Lab (Based on Paper (3.1) & (2.3) (50)

1.1 Basic Science & Humanities

Technical English Writing (50)

Article, Noun, Pronoun, Adjective conjunctions

Comprehension, Precise writing, Present, Past, future tense

Homonyms, one word substitution, Prefix & suffix, cetter

References:

English Language, Jill Talbot, Pengion,

Wren & Martin

1.2 Abstract Algebra (50)

Unit I: Groups-Definition and simple properties of group and subgroups. Permutation group, cyclic groups

Unit II: Cosets, Lagrange's theorem on the order of subgroup of a finite group, Morphisms of group, Cayley's theorem. Normal subgroup and quotient group Fundamental theorem of homomorphism of group

Unit III: Rings, Definition and examples of rings, residue class rings, special classes of rings (integral domains, division rings, fields) Simple properties of rings, Subrings and sub fields Ring homomorphism and ring isomorphism, Field of quotients of an integral domain

Unit IV:

Ideals-Ideals, principal ideal, principal ideal ring, quotient ring, prime ideal, maximal idea, fuchdean ring and its properties, Unique factorization theorem Polynomial ring Vector spaces-Definition and simple properties, subspaces, Linear sum of two subspaces

Unit V:

Linear dependence and linear independence of vectors space Dimension of a finitely generated vector space Basic of a vector space finite dimensional vectors, Dimension of a subspace, Homomorphism of vector spaces, Isomorphism of vector spaces, isomorphism of vector spaces, quotient spaces, Direct sum of spaces, Dimension of a direct sum

References:
A First Course in Abstract Algebra by J.B. Fraleigh, Pearson Publication

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1.3 Numerical Analysis (50)

Unit I: Differences, relation between differences and derivatives, differences of polynomials, Newton's formula for forward and backward interpolation, divided differences and simple differences, Newton's general interpolation, formula's Lagrange's interpolation formula, Error in interpolation

Unit II:
Error Its sources, propagation and analysis, Numerical solutions of system of linear equations Direct Method, Pivoting and sealing in Gaussian elimination, Error Analysis, Iteration Method, Jacobi's Method, Gauss-Siedel Method

Unit III:
Numerical differentiation and numerical Integration-Simpson's Weddle's and the Trapezoidal rules, Newton-codes quadrature formula Gauss quadrature formula.

Unit IV:
Root finding for nonlinear equations (Transcendental and algebraic equations) Regula-Falsi method and Newton-Raphson's method, fixed-point method, Order of convergences

Unit V:
Numerical solution of ordinary differential equations of last and second order and system of simultaneous equations, Euler's method, Runge-Kutta's Method, Predictor-Corrector method (Milne's method)

References:
1. Elementary Numerical Analysis by conte and de Boor Me-Graw Hill ¾ edition
2. Numerical analysis by Kendal F. Alkinson (Elementary one)John Wiley

Computer Applications

2.1 Operating System (33)

Unit I:
Operating System as resource Manager:-
O S Classification: - Simple Monitor, Multiprogramming, Time Sharing, Real Time Systems,

Multiprocessor System, Operating System Services
File System:-
File support, access methods, Allocation method-contiguous, ;inked and Index allocation, Directory System,- Single level, Tree- Structured a cyclic graph and General graph directory, file Protection

Unit II:
CPU Scheduling:-
Basic scheduling Concepts, Process Overview Process States, Multi Programming, schedulers and scheduling algorithms, Multiple- Processor scheduling

Unit III:
Memory Management:-
Bare machine Approach Resident Monitor, Partitions, paging and segmentation, Virtual demand Paging

Deadlocks:-
Deadlock Characterization, Deadlock prevention, avoidance detection and recovery

Unit IV:
Resource Protection:-
Mechanisms, Policies, Domain of Protection, Access Matrix and its Implementation, Dynamic Protection Structures

Unit V:
Windows NT:-
Installation, PDC, BDC, Standalone Server, User Accounts, Policies, Privileges, Web Server, Dns, Dhep, wins, router

References:
Operating System by Galvin Shilberschms
Operating System by Madnick & Donobvan Publisher Me Graw Hill
Modern O S by Tanenbaum Publisher PIII

2.2 System Programming & Microprocessor (33)

Unit I: Components of system software, Evolution of system software, General machine structures (memory, register, data institutions) machine language, problems in machine language programming, using Octal or hexadecimal, Assembly language, its advantages and disadvantages, high level language, witch level to us

Unit 2: General design of assembler (one pass and two pass assembler), brief description of different phases of a compiler
Software tools for program entry and testing, Line and screen editors, debug monitors.

Unit 3: Components of a programming system Microprocessor one pass & tow pass, Loader (Compile & go, absolute, subroutine linkage relocating direct linking), loader scheme binders, linking loader, operating system-types and basic functions of an operating system

Unit 4: Architecture & organization of 8 bit microprocessor (8085) concept of address, data & control buses, internal operation, addressing modes, instruction format & execution timings
Architecture & Organization of 8086, Addressing modes, Instruction, Format, set

Unit 5: Digital Interfacing: Programmable parallel ports and handshake, input/output interfacing display and keyboards, printer interfacing and sharing, **ACD** and **DA:** specifications, interfacing and

applications (A Micro Computer-based Industrial process control system and instrument)
I/O & Memory interfacing, programmed I/O Interrupts types, masking memory mapped I/O and interfacing memory

References:
System programming-J.J. Donavan Me Graw Hill 1987
Introduction to system software-Books by D. M. Dhamdhere S. Ellzay, Tata Me-Graw Hill 1986
Programming language-Books by the authers Bratt, Tucker, Horovrity, tenet
Respectively
Microprocessor Architecture- R.S. Goangar, Penram International Publication
Microprocessor & Micro Computer Based System Design, M. Raliquzzane, New Delhi
& U S B Publications
Introduction to Micro Processor- Aditya P. Mathur, Tata Me Hill

2.3 Data Structures using C++ (34)

Unit I:
Object Oriented Concepts: Object Oriented Concepts, advantage of OOPS, characteristic of Object Oriented Languages

Unit II:
C++ Programming Basics Basic program construction, Data types, Operators, Library function Control Statements, Loops, Structure, Function, Storage Classes, arrays, and pointers

Unit III:
Object and Classes: classes and objects, Constructions, Objects as function Arguments, friend function overloading, Operator overloading, inheritance, virtual functions, friend functions, Error handing, Files and streams,

Unit IV:
Linear Linked structures, the data types "list", linked lists, doubly & circular linked lists, linked representation of stacks and queues, simple applications

Unit V:
Nonlinear structures: trees, basic terminology, binary trees, their implementation, tree traversal, search insertion and deletion, simple application of binary trees, Introduction to graphs insertion and their representation

References:
1. An Introduction to Data Structures with Applications, Jean-Paul lremblay & P.G. Sorenson, Me Graw Hill, 1985
2. Fundamentals of data structure by E. Horowitz, S. –Sahni,. Galgotia Publications.
3. Data Structures and Algorithms, A. V. Aho, J.F. Hoperaft & J.D. Ullman, Addison- Wesley Publishing Co. 1987
4. Fundamental Algorithms (The art of Comp. Prog. Vol. I) D.E. Kunth, Narosa Publishing House, New Delhi, 1992.
5. Data Structures, A.M. Tenenbaum, Prentice Hall of India.
6. Complete reference C.M. Tata Me Hill

Computer System Design and Maintenance

3.1 GUI Design (33)

Programming in Visual Basic

Introduction:
Graphical User Interface, Features, Advantages.
Visual Basic overviews/and environment. Overview of main screen/ title bar / menu bar / toolbar/ toolbox, using menus/customizing a form/building the user interface/creating controls/command buttons/ text boxes/labels/image controls.

Program Elements:
Statements in visual basic/writing codes/dialing box, variables/types of variable, strings/numbers Writing procedures. Visual basic program structure, Project, forms/modules and frames Projects with multiple, Forms Displaying in formation on Forms/picture boxes/ test boxes, Printer objects controlling program flow/built-in function/ user defined functions and procedure, Array, grids and records/ sorting and searching of records Objects/object oriented programming, creating object/building classes

Database Connectivity
Querying the database, connecting through **ADODB, ODBC,**
References:
The Complete Reference **VB 6.0,** Tata Me Hill

3.2 Business Data Processing (33)

Unit 1 (a) Introduction to Business Organization: Business system and its environments, major business functions including production, marketing personnel & finance, information systems need role of management services

(b) System investigation: Project selection feasibility analysis, fact gathering, system design & implementation, cost/benefit analysis, system evaluation, input form design punched card, key to disk system, optical readers, interactive, input data validation, documents and its importance, system maintenance and its review

Unit 2COBOL Language **COBOL** program structure, Sections, paragraphs Divisions Input-Output Verbs, Data transfer verbs, Conditional verbs including condition-name-condition, Table handing in **COBOL**, Character handing, sub outline

Unit 3 Introduction to file processing Record, files sequential and indexed sequential files, direct access (random) files, various files operation, master files and transaction files, File handing in **COBAL, SORTING, MERGINE, UPDATION,** Report writing facility in **COBOL,** Segmentation, Library facility

Unit 4 Introduction to DBMS: The data base approach, objectives of **DBMS,** the process of data base design: Conceptual logical and physical models, design philosophers, data definition and manipulation languages, normal forms, Scheme and Subschema

Unit 5 Introduction to relational, hierarchical and network models, their **DDL** and **DML** data base

system architecture: Basic concepts, storage structure and addressing techniques, indexed and direct access organizations, hashing, indexed searching techniques, multiple key retrieval and inverted file systems,

References:
1. System Analysis for Business Data Processing-Clifton N.D. Prentice Hall
2. An Introduction to Business Data Processing –Orilla, Me Graw Hill
3. Structured **COBOL,** Philippakins- Kazmier, Me Graw Hill
4. **COBOL**, Stern & Stern, Johan Wiley & Sons, 1984
5. An Introduction to Data Base System, Vol-1, C.J. Data Addision Wesley, 1987
6. Computer Data Base Organization, James Martine, Prentice, Hall of India, 1984

3.3 Data Communication: (34)

Unit I:
Introduction: Data Communications, Data Communication, Networking, Protocols and Protocol Architecture. Data Transmission Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments

Unit II:
Transmission Media: Guided Transmission Media, Wireless Transmission Data Fncoding-
Digital Data, Digital Signals/ Digital Data, Analog Signals/ Analog Data, Digital Signal/ Analog Data, Analog Signals

Unit III:
Data Communication Interface:-
Asynchronous and Synchronous Transmission, Line Configurations, Interfacing Data Link Control:- Flow Control, Error Detection, Error Control, High Level Data Link Control, Other Data Link Protocols.

Unit IV:
Multiplexing:-
Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing

Unit V:
WAH:-
Circuit Switching
Switching Networks, Circuit-Switching networks, Switching Concepts, Routing in Circuit Switched Networks, Control Signaling
Packet Switching:-
Packet- Switching Principles, Routing, Congestion Control, X.25

References:
Data & Computer Communication- William Stalling, Prentice Hall India
Data Communication, Prakash C. Gupta, Prentice Hall India

B.Sc. (Computer Science)
III Year

1. Basic Science & Humanities
India in 20th Century (75)
Real Analysis (75)
Matrices and Linear Programming (75)

2. Computer Application
Introduction to Computer Graphics (50)
System Analysis & Design (50)
Design and Analysis of Algorithm (50)

3. Computer System Design and Maintenance
Computer Networks (50)
Introduction to Database(50)
Unix & Shell Programming (50)

Practical
Computer Application Lab (Based on Paper 2.1) (75)
Computer System Design and Maintenance Lab (Based on Paper 3.2 &3.3) (75)

Note: In Final Students can Opt for Any Tow Subject Omitting One Subject

1.2 Real Analysis (75)

Unit 1: Description of the real number system as a complete ordered filed, Bounded and unbounded sets of real numbers: Supermum and infimum of a bounded set. Metric space, Neighborhood of a point, Limit point of a set; compactness, Heine-Borel Theorem, Bolazano-Weierstrass theorem; Lim sup & Lim Inf.

Unit 2: Real sequences and their convergence, Cauchy sequence, Cauchy's General principal of convergence, Convergence of series, comparison test; root test; Raabe's test; Bertrand and Morgan's test for series of positive terms, Logarithmic test and integral test Alternating series; Leibnitz test

Unit 3: Real-valued function of a real variable- continuous function and their properties (Theorems); Characterization continuity in terms of convergent sequences Uniform continuity

Unit 4: Derivability Rolle's theorem; Lagrange's mean value theorem, Taylor's and Maclatum's theorems with Lagrange's and Cauchy's Forms of remainder, rigorous proof of power series, expansions of sinx, cosx, log (1+x) and (1+x)n

Unit 5: Riemann integration of continuous functions on closed and bounded intervals, properties of Riemann integrals; Fundamental theorem of integral calculus for continuous functions

References:

1. Principles of Mathematical Analysis- W. Rudin
2. Mathematical Analysis by S.C. Malik (Revised by Arora)
3. Fundamentals of mathematical Analysis by G. Das and S. Pathnayak

Basic Science and Humanities

1.1 India in 20th Century(50)

The students are supposed to know the evolution of India in the following areas

Historical perspective

Political developments

Agricultural growth

Fiscal and industrial environment

Social evolution

Governance

Financial environment

International

Education

Fine Arts

Computer Applications

2.1 Introduction to computer Graphics: (50)

Unit I: Introduction, Programming in the Simple Raster Graphics Package (**SRGP**)-Drawing with **SRGP**, Basic Interaction Handing, Raster Graphics Features, Limitations of **SRGP**
Graphics hardware:
Hard Copy Technologies, Display Technologies, Raster/Random Display Systems, the Video Controller, Random Scan Display Processor, Input Devices for Operation Interaction

Unit II:
Basic Raster Graphics Algorithms for Drawing **2D** Primitives
Scan Converting Lines; Scan converting Circles, Scan Converting Ellipses, Filling Rectangles, Filling Polygons, Filling Ellipse Ares, Pattern Filling
Huck, Primitives Line Style and Pen Style, Clipping in a Raster World, Clipping Lines, Clipping polygons, Character Generation, SRGP Copy Pixel, Antialaising

Unit III:
Geometric Transformations:-
2D Transformations, homogenous Coordinates and Matrix Representation of **2D** Transformation, Composition of **2D** Transformations, The Window to View port Transformation

Unit IV:

Matrix Representation of **3D,** Composition of **3D**
Transformations, Transformations as a Change in Coordinate System, Viewing in **3D:** Projections, Specifying an Orbitary **3D** View, the Mathematics of Planar Geometric Projections, Implementation of Planar Geometric Projections

Unit V:
Hidden line and surfaces, Visible Surface Determination,
Rendering and animation

References:

Computer Graphics Principle & Practice- Foley, Pearson Education Asia
Principles of Interactive Computer Graphics-W.M. Newman, Tata Me Hill
Computer Graphics Donald Hearn & Baker, Prentice Hall of India

2.2 System Analysis & Design (50)

Unit I: System Concepts and the Information Systems Environment
Introduction The system Concept Definition Characteristics of a System Organization, Interaction, Interdependence, Integration, Central Objective Elements of a System; Control Feedback, Environment Boundaries and Interface Types of System The System Development Lifo Cycle: Recognition of need Feasibility Study Analysis Design Implementation Post-Implementation and Maintenance

Unit II: System Planning and the Initial Investigation
Dimensions of Planning Initial Investigation: Needs Identification Determining the User's Information Requirements Problem Definition and Project Initiation Background Analysis Fact Analysis, Determination of Feasibility
Information about the Firm, Information about User Staff, Information about work Flow, Information-Gathering Tools: Review of Literature, Procedures, and Forms, On-Site Observation Interviews and questionnaires,

Unit III: The Tools of Structured Analysis
Structured Analysis- The Tools of Structure Analysis: The Data Flow Diagram (DFD) Data Dictionary Decision Tree and Structure English Decision Tables Feasibility Study- System Performance Definition Statement of Constraints Identification of Specific System Objectives, Description of Outputs, Feasibility Study: Considerations, Steps in Feasibility Analysis, Feasibility Report, Oral Presentation,

Unit IV: Cost/Benefit Analysis & System Design
Introduction Data Analysis, Cost/Benefit Analysis: Cost and Benefit Categories Procedure for Cost/Benefit Determination. The System Proposal
The Process of Design: Logical and Physical Design, Design Methodologies: Structured Design, Form-Driven Methodology- The IPO Charts, Structured Wall through Personnal Allocation Audit Conatderntion: Processing Controls and Data Validation Audit Trail and Documentation Control

Unit V: File Organization and Data Base Design
File Structure, File Organization: sequential Organization, Indexed- Sequential Organization, Inverted List Organization, Direct-Access Organization Data Base Design:

System Testing and Quality Assurance
System Testing The Nature of Test Data, The Test Plan: Activity Network for System Testing, System Testing, Assurance: Quality Assurance Goals in the System Life Cycle, Levels of Quality Assurance, Trends in Testing, Role of the Data Processing Auditor The Audit Trail

References:
System Analysis & Design, Elias M Awad, Galgotia Publication

2.3 Design & Analysis of Algorithm (50)

Unit I: Algorithm Specification, Pseudocode Conventions, Recursive Algorithms

Performance analysis

Space complexity, Time complexity, Asymptotic notation, Practical complexities, Performance measurement, Randomized algorithms: an informal description Identifying the repeated element, Primality testing, Advantages and disadvantages

Elementary Data Structures

Stacks and Queues, Trees, Terminology, Binary Trees, Dictionaries, Binary Search Trees, Cost Estimation, Priority Queues, Heaps, Heap Sort, Sets and Disjoint Set Union Union and Find Operations, Graphs, Introduction, Definitions, Graph Representations

Unit II:

Divide and Conquer

General Method, Binary Search, Finding the Maximum and Minimum, Marge Sort,
Quick Sort, Performance Measurement, Randomised Sorting Algorithms
Selection, A Worst Case Optimal Algorithms, Implementation of Select 2
Strassen's Matrix Multiplication, Convex Hull, Some Geometric Primitives
The Quick Hull Algorithm, Graham's Scan, An O (nlogn) Divide and Conquer Algorithm

Unit III:

The Greedy Method

The General Method, Knapsack Problem, Tree Vertex Splitting, Job Sequencing With Deadlines, Minimum costy Spanning Trees, Kruskal's Algorithm, An Optimal, Randomised Algorithm, Optimal storage on Tapes, Optimal Merge Patterns
Single Merge Patterns, Single Source Shortest Paths

Unit IV:

Dynamic Programming

The General Method, Multi Stage Graphs, All Pairs shortest Paths, Single Source
Shortest Paths, General Weights, Optimal Binary Search Trees, String Editing
Reliability Design, The Traveling Salesperson Problem, Flow Shop Scheduling
Basic Traversal and Search Techniques
Techniques for Binary Trees, Techniques for Graphs, Breadth First Search and traversal, Depth First Search and Traversal

Unit V:

Back Tracking

The General Method, The 8- Queens Problem, Sum of subsets, Graph Coloring
Hamilton Cycles, Branch and bound Method, Least Cost Search, The 15 Puzzle, Bounding, FIFO Branch and Bound LC Branch and bound

References:

Fundamental of Computer Algorithms, S.C. Gupta & V.K. Sultan Chand & Sons, New Delhi
Introduction to Algorithms, by Thomas H. Corman, Prentice Hall India
Fundamental of Computer Algorithm, Ellis Horowitz, Galgotia Publications, New Delhi

Computer System Design and Maintenance

3.1 Computer Networking (50)

Unit I:

Introduction: Uses of networks (goals and applications), OSI reference model, Example Network- Novell Netware, **ARPANET, NSFNET,** The Internet

The Physical Layer: Transmission media: Twisted pair, Base band and Broadband coaxial cable,

Fiber optics; Wireless Transmission: Ratio transmission, Microwave transmission, Infrared and light ware transmission, TSDN services, Virtual Circuits verses circuit, Switching, Transmission in ATM Networks; Paging Systems, Cordless Telephones, Cellular telephones; Communication Satellite.

Unit II:
The data Link Layer: Farming Error control, Flow control; Error detection and Correction; Protocols: Simplex stop and wait protocols, one but stiding window, Using Go Back, Example, The Data Link Layer in the Internet

Unit III:
The Medium Access Sub Lauer: Farming, Static and Dynamic Channel Allocation in LANS and MANS; IEEE standard 802.3 and Ethernet; IEEE standard 802.4 and Token Bus IEEE 802.4 and token Ring; Bridges: Bridges from 802.x to 802.y, Transport Bridges, Source Routing Bridges

Unit IV:
The Network Layer: Network layer design issues, shortest path routing, Flooding Flow based routing, Broadeast routing, Congestion control and prevention policies; Internet working: connectionless Inter working, Funneling Internet work Routing, Fragmentation, Firewalls, IP protocols, IP address, Internet control protocols.

Unit V:
The Transport Layer: The transport service; Transport protocols Addressing, Establishing and refenamg a connection, the Internet transport proticols **TCP.**
Introduction to Internet**, TCP/IP, PPP, SMTF, MIME,**

References:
Tanenbaum, A.S. Computer Networks, (PHI), 1990
Stalling, W. Data and computer Communication, Prentice Hall of India, 1995
Aggarwal R.B. Computer Networks and HSDN Systems Hanna Publishers, New Delhi, 1995

3.3Unix & Shell Programming (50)

Unit-1: Unix Diversion
Unix System kernel and utilities, File & Directories, Single & compound Statement, Command Library and Include Files

Unit-2: Unix System Administration
File System mounting & un mounting, System booting, shutting down, handing user account, backup, recovery, security, terminals, printer and modem.

Unit-3: Different Tools & Debugger
System development tool, Lint, Make, SCCS(source code control, system), Language Development Tools Yace, Lex and M4, text formatting, tools troff, nroff, tbi, pie and aqn Debuggers Dbx, Abd, Sdb, strip and Ctrace.

Unit-4: UNIX shell Programming
Bourne Shell, Korn Shell and G Shell-Shell meta characteristics, shell variable and scripts, facilities and command, environment, integer arithmetic and string manipulation, decision making, aliasing, arrays and job control

Unit-5: Portability with C

System Call and Library function, Command line arguments, Multitasking-back round process, Child Parent Relationship, Process identifiers, Croking processor, process synchronization, sharing of data.

References:

1. UNIX Programmers guide by Prata, BPB
2. Eochen & Wood "Unix Shell Programming"
3. Fileder, Hunter, "Unix System Administration"
4. "C Oddyssy for Unix"
5. Hahn, The internet complete reference, TMII
6. Unix & C Programming Excel