

M.Sc. Computer Science

NEP Syllabus- 2022-23

(CBCS system)



Raja Mahendra Pratap Singh State University,

Aligarh (UP) 202001.

M.Sc. Computer Science

NEP-2022-23.

| First Semester | | | | | | |
|------------------------------------|-------------------|--|----------------|-----------------------|-----------------------|--------------|
| Course Type | Paper Code | SUBJECTS | Credits | Internal Marks | External Marks | Total |
| Compulsory Course | RB070701T | Computer Architecture | 4 | 25 | 75 | 100 |
| | RB070702T | Discrete Mathematics | 4 | 25 | 75 | 100 |
| | RB070703T | Digital Electronics | 4 | 25 | 75 | 100 |
| | RB070704T | Programing using -C | 4 | 25 | 75 | 100 |
| Compulsory Course Practical | RB070705P | Practical (Based on Papers 701-704) | 4 | 25 | 75 | 100 |
| | RB070706R | Research Project(Tour/Training/Project) | | | | |
| MINOR | RB070707* | (Any One) from other Faculty | 4 | 25 | 75 | 100 |
| | | Total | 24 | 150 | 450 | 700 |

| Second Semester | | | | | | |
|------------------------------------|-----------|--|---|----|-----|-----|
| Compulsory Course | RB070801T | Operating System | 4 | 25 | 75 | 100 |
| | RB070802T | Database Management System | 4 | 25 | 75 | 100 |
| | RB070803T | Numerical Methods | 4 | 25 | 75 | 100 |
| Elective Course-I | RB070804T | Object Oriented Programming with C++ | 4 | 25 | 75 | 100 |
| | RB070805T | Visual Basic.net | | | | |
| Compulsory Course Practical | RB070806P | Practical (Based on Papers 801-805) | 4 | 25 | 75 | 100 |
| | RB070807R | Research Project(Tour/Training/Project) | 8 | 50 | 150 | 200 |

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|--|--|--------------|-----------|------------|------------|------------|
| | | Total | 28 | 150 | 450 | 700 |
|--|--|--------------|-----------|------------|------------|------------|

| Third Semester | | | | | | |
|------------------------------------|-----------|--|-----------|------------|------------|------------|
| Compulsory Course | RB070901T | Computer Networks | 4 | 25 | 75 | 100 |
| | RB070902T | Software Engineering | 4 | 25 | 75 | 100 |
| | RB070903T | Data structure using C/C++ | 4 | 25 | 75 | 100 |
| Elective Course-II | RB070904T | System analysis and Design | 4 | 25 | 75 | 100 |
| | RB070905T | Statistical Method & Applications | | | | |
| Compulsory Course Practical | RB070906P | Practical (Based on Papers 901-905) | 4 | 25 | 75 | 100 |
| | RB070907R | ReviewLiterature/Assignment/Tour | 4 | 25 | 75 | 100 |
| | | Total | 24 | 230 | 470 | 700 |

| Fourth Semester | | | | | | |
|------------------------------------|-----------|--|-----------|------------|------------|------------|
| Compulsory Course | RB071001T | Object Oriented Programming with JAVA | 4 | 25 | 75 | 100 |
| | RB071002T | Computer Graphics | 4 | 25 | 75 | 100 |
| | RB071003T | Techniques of Operation Research | | | | |
| Elective-IV Course | RB071004T | E –commerce & ERP | 4 | 25 | 75 | 100 |
| | RB071005T | Design and Analysis of Algorithm | | | | |
| Compulsory Course Practical | RB071006P | Practical (Based on Papers 1001-1004) | 4 | 25 | 75 | 100 |
| | RB071007R | Project Work | 4 | 25 | 75 | 100 |
| | | Total | 24 | 150 | 450 | 700 |

*Elective Course to select any one out of two given.

*Minor course will be from other Faculty.

FIRST SEM

RB070701-Computer Organization and Architecture

UNIT I

Computer Evolution: Brief history of Computer, Classification of Computer, Structure of a Computer System, Arithmetic Logic Unit, Control Unit, Von Neumann Architecture. Integer Addition and Subtraction, Floating point representation., Signed numbers, Binary Arithmetic, 1's and 2's Complements, Booths Algorithm, Hardware Implementation, IEEE Standards, Floating Point Arithmetic, The accumulator, Shifts, Carry and Overflow. Instruction Characteristics, CPU with Single BUS, Types of Operands, Types of Operations, Addressing Modes, Instruction Formats.

UNIT II

Processor Organization: Parallelism and Computer arithmetic, Computer arithmetic associatively. Floating Point in the 8086, Programmers Model of 8086, Register Organization, 8086 Registers, Instruction Cycles, Addressing Modes. Micro operations, The Instruction cycle, Control of the CPU, Functional Requirements, Single, Two, Three bus structure, Execution of a complete instruction, Branching, Sequencing of Control Signals, Hardwired Control Unit, Micro-Programmed Control.

UNIT III

Memory Organization: Characteristics of Memory Systems, Main Memory, Types of Memory, Memory system considerations, Design of memory subsystem using Static, Dynamic Memory Chips, Memory interleaving **High Speed Memories:** Cache Memory, Structure of cache and main memory, Elements of Cache Design, Mapping functions, Replacement algorithms, External Memory, Virtual memory

UNIT IV

I/O Organization: Input / Output Module: Need, Techniques, Interrupt Driven I/O, Basic concepts of an Interrupt, Response of CPU to an Interrupt, Design Issues, Priorities, Interrupt handling, Types of Interrupts. Data Transfer Techniques, Data Memory Access, Buses, Types of buses, I/O Interface, Synchronous and Asynchronous Data Transfer, Serial I/O, Input Devices, Output Devices, Multiprogramming vs. Multiprocessing, Comparison between closely coupled and loosely coupled Multiprocessor

UNIT V

Microprogramming: Basic Principles, Features, Hardwired vs. micro programmed computers, Applications and advantages of microprogramming, Limitations of microprogramming, Computer Clock, Micro Instructions and its Control Path, Microcode, Machine Instruction. Parallel Organization, Instruction Set Architecture (ISA), RISC and CISC, Characteristics of CISC, Characteristics of RISC, RISC versus CISC, Vector Processing Requirements and Characteristics of vector processing.

RB070702- Discrete Math

Unit I

Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness.

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

Unit II

Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings.

Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

Unit III

Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.

Unit IV

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complemented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, propositional calculus. Coding theory: Coding of binary information and error detection, decoding and error correction.

RB070703-Digital Electronics

UNIT-I

Number System & Boolean Algebra: Number System: Binary, Octal, Decimal, Hexadecimal, Conversion of Number System, Binary Arithmetic & Complement, Binary Codes: Weighted & Non Weighted, Gray Code, Excess-3 Code. Error Detection Codes, Hamming Code, Boolean Function, Boolean Postulates, De-Morgan's Theorem, Boolean Expressions: Sum of Product, Product of Sum, Minimization of Boolean Expressions using K-Map, Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, Implementations of Logic Functions using Gates, NAND, NOR Implementations, Multilevel gate Implementations.

UNIT-II

Combinational Circuits: Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Magnitude Comparator: Two Bit Magnitude Comparator, Three Bit Magnitude Comparator, Multiplexer & De-Multiplexer: 4*1 Multiplexer, 8*1 Multiplexer, Decoder & Encoder, Parity Checker & Generator, Code Converter.

UNIT-III

Sequential Circuit: Introduction to Flip Flops: SR, JK, T, D, Master Slave Flip Flops, Conversion of Flip Flops, Characteristic Table & Equation, Edge Triggering & Level Triggering, Excitation Table, State Diagram, State Table, State Reduction, Design of Sequential Circuits.

UNIT-IV:

Registers: Introduction of Registers, Classification of Registers, Register with Parallel Load, Shift Registers, Bidirectional Shift Register with Parallel Load.

UNIT-V:

Counters: Introduction of Counter, Asynchronous/Ripple Counters, Synchronous Counters, BCD Counter, 4-bit Binary Counter with Parallel Load, Design of Synchronous Counters, Ring Counter, Johnson Counter

Suggested Books:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano
3. Digital Electronics (TMH) 1998 : Malvino and Lea

RB070704- Programming using C

UNIT-I

C basics: C character set, Identifiers and keywords, Data types, constants, variables and arrays, declarations, expressions statements, symbolic constants, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, conditional operators, bit operators.

UNIT-II

Decision Control Structures: If Statement, If-else statement, Nested if (), If () ladder, Switch, case statement, Iterative statements: For loop, While loop, Do-while () loop, Conditional statements: Break, Continue, Storage Classes, Array: Declaration of an Array, Initialization of Array, Types of Array: Single Dimension Array, Two, Dimensional Array, Address Calculation of an Element of a 2-D Array

UNIT-III

Functions: Library Functions, User Defined Functions, Function Declaration, Prototype Declaration, Types of Arguments: Actual Arguments, Formal Arguments, Function Definition, Passing Arrays as Parameters, Methods to Call a Function: Call by Value, Call by Reference.

UNIT-IV

Pointers: Declaration of Pointer Variables, Pointer Arithmetic, Returning Multiple Output Values through a Function Strings.

UNIT-V

Structures, Unions, Array of Structures, Enumerations, File Handling: Opening a File, Closing a File, File, Opening Modes, Reading from and Writing to a File, Copying Content of an Existing File to another, Command Line Arguments, argc and argv Parameters, Pre-processor Directives.

Suggested Books:

1. E.Balagurusamy, "Programming in ANSI C", TMH
2. Peter Norton's, "Introduction to Computers", TMH
3. Yashwant Kanetkar, "Let us C", BPB

SECOND SEM

RB070801-Operating System

Unit I

Operating system: concept, definition, types: on-line system, off-line system, spooling, buffering, multiprogramming, multitasking, multiuser system, multiprocessing, batch processing system, time sharing systems, parallel systems, distributed systems, realtime systems, Operating system services, system calls and system program.

Unit II

File concepts-file support, access methods, allocation methods, directory systems, process concept, process scheduling, scheduling concepts, algorithms evaluation techniques, NTFS, HTFS, AFS.

Unit III

Memory Management- monitors, swapping, MFT, I/W, compaction, paging, segmentation, paged segmentation, segmented paging, multilevel paging, Virtual Memory- demand paging, overlays, page replacement algorithms, thrashing, disk & drum scheduling -FCFS, SSTF, SCAN, C-SCAN, Look, C- Look.

Unit IV

Deadlock- problem, prevention, avoidance, detection, recovery, concurrent processes, precedence graph, critical section problem, semaphores & its implementations, introduction to networks and distributed systems, distributed coordination.

Unit V

Architecture of Unix O.S,: introduction to system concept buffer cache, buffer headers, structure of buffer pool, buffer retrieval, reading and writing disk blocks, advantage and disadvantage of buffer cache, i-node, structure of regular files, directories, conversion of path name to an inode, super block inode assignment to new file, allocation of disk blocks.

Text Books:

1. Operating systems concepts by Silberschatz.
2. The design of the UNIX operating system by Maurice J. Bach.

RB070802-Data Base Management System

UNIT-I

Introduction: Database System Concepts, Database Users, and Architecture Introduction to Database System with example, Introduction to Traditional File Oriented System, Characteristics of the Database Approach, Components of Database System, Database Users, Advantages and disadvantages of Using a DBMS, Structure of DBMS, Database Schemas and Instances , DBMS Architecture, Data Independence, Database Languages and Interfaces, Classification of Database Management Systems.

UNIT-II

Data Modelling & Relational Database Management System Data Modelling Using the Entity Relationship Model: Entity Types, Entity Sets, Attributes, Keys, Relationships, Relationship Types, Roles, and Structural, Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, Design Issues.

UNIT-III

The Relational Data Model: Relational Constraints and the Relational Algebra: Relational Model Concepts, Relational Constraints and Relational Database Schemas Update Operations and Dealing with Constraint Violations, Basic Relational Algebra Operations, Additional Relational Operations, Examples of Queries in Relational Algebra.

UNIT-IV

SQL:SQL and Database Design Theory and Methodology Structured Query Language The Relational Database Standard: Data Definition, Constraints and Schema Changes in SQL, Types of SQL Commands, SQL Operators and their Procedure, Insert, Delete, and Update Statements in SQL Queries and Sub Queries, Aggregate Functions, Joins, Unions, Intersection, Minus, Views (Virtual Tables) in SQL. Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Armstrong Rules, Closure of Attributes, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce Codd Normal Form.

UNIT-V

Transaction Processing: Concurrency Control and Distributed Database Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Concurrency Control Techniques, Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering.

Suggested Books:

1. A.K. Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.

RB070803-Numerical Methods

UNIT-I

Roots of Equations: Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

UNIT-II

Interpolation and Extrapolation : Finite Differences, The operator E-Newton's Forward and Backward Differences, Newton's dividend differences formula, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace, Everett formula.

UNIT-III

Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three, eight rule.

UNIT-IV

Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method.

UNIT-V

Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Ranga Kutta method.

Suggested Books:

1. Scarbourogh, "Numerical Analysis".
2. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, 3. S.S.Shashtri, "Numerical Analysis", PHI

RB070804-Object Oriented Programming Using C++

UNIT-I

Introduction: Introducing Object Oriented Approach, Procedural Programming Language Vs Object Oriented Language. Basic concept of OOPs, operators, tokens, variables, Keywords, Data types, identifiers, characters, typedef statement, constants, Enumerated data type.

UNIT-II

Control Flow: If statement, If Else statement, Nested If, Else, Statements, For Loop, While Loop, Do, While Loop, Break, Switch, Continue, goto. Classes and Objects, Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, Constructors and destructors, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract classes.

UNIT-III

Array: Array Illustration, Multi, Dimensional arrays, Strings, Array of Strings, Function prototype, function return data type, parameter passing, Default argument, Inline function, Function Overloading, Array Function, Operator Overloading, Friend function

UNIT-IV

Pointers: Pointer to Derived Class, array of Pointers, Inheritance and Polymorphism: Inheritance, Class hierarchy, derivation, public, private & protected, abstract Classes, Single, Multilevel, Multiple, Hierarchical, Hybrid, benefits of Inheritance.

UNIT-V

Files and Exception Handling ,Template: Streams and files, Namespaces, Exception handling. class templates,function templates

Suggested Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.
- 2.S.B.Lippman&J.Lajoie," C++ Primer",3rdEdition, Addison Wesley, 2000.The C programming Lang.,Person Ecl,Dennis Ritchie
3. R.Lafore,"Object Oriented Programming using C++",Galgotia Publications,2004

RB070805-Visual Basic .NET

UNIT-I

Visual Basic .NET and the .NET Framework: Introduction to .net framework ,Features, Common Language Runtime (CLR) ,Framework Class Library(FCL).Visual Studio.Net – IDE, Languages Supported, Components. Visual Programming, VB.net, Features, IDE, Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window.

UNIT-II

Elements of Visual Basic .net: Properties, Events and Methods of Form, Label, Text Box, List Box, Combo Box, Radio Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, HScroll bar, VScroll Bar, Group Box, Tool Tip, Timer.

UNIT-III

Programming in Visual basic .net: Data Types, Keywords, Declaring Variables and Constants, Operators, Understanding Scope and accessibility of variables, Conditional Statements, If- then, If- then- else, Nested If, Select Case, Looping Statement, Do loop, For Loop, For Each, Next Loop, While Loop, Arrays, Static and Dynamic.

UNIT-IV

Functions, Built-In Dialog Boxes, Menus and Toolbar: Menus and toolbars, Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes –Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, Input Box, MsgBox, Interfacing With End user, Creating MDI Parent and Child, Functions and Procedures, Built-In Functions, Mathematical and String Functions, User Defined Functions and Procedures.

UNIT-V

Advanced Concepts in VB.Net: Object Oriented Programming, Creating Classes, Objects, Fields, Properties, Methods, Events, Constructors and destructors, Exception Handling, Models, Statements, File Handling, Using File Stream Class, File Mode, File Share, File Access Enumerations, Opening or Creating Files with File Stream Class, Reading and Writing Text using Stream Reader and Stream Writer Classes, Data Access with ADO.Net – What are Databases? Data Access with Server Explorer, Data Adapter and Data Sets, ADO.NET Objects and Basic SQL.

Suggested Books:

1. Jesse liberty :”Learning Visual Basic.net”
2. Steven Holzner: “ VB.NET BlackBook “
3. Chuck Easttom: “ Learn VB.NET”

THIRD SEM

RB070901-Computer Network

UNIT I

Introduction: Definition of a Computer Network, Components of a computer network, Types of Network: Based on Topology (Bus, Star, Ring Mesh, Tree), Based on Size Technology and ownership (LAN, MAN, WAN). Network topologies, Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison, Considerations when choosing a Topology: Switching, Circuit switching, Message switching, Packet switching, Implementation of packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques: Multiplexing, FDM, Frequency division multiplexing, WDM, Wavelength division multiplexing, TDM, Time division multiplexing.

UNIT II

Network Software & Network Standardization: Introduction: Networks Software, Protocol hierarchy, Design issues for the layers, Merits and De-merits of Layered Architecture, Service Primitives: Reference models, The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Model

UNIT III

Data Link Layer: Services provided to the Upper Layer, Framing, Error Control, Flow Control, IEEE Standards for MAC Sub layer, Network Layer: Services provided to the Upper Layer: Routing Algorithms (Centralized, Distributed), Congestion Control (Token Based and Non Token Based), Internetworking.

UNIT IV

Data Communications: Introduction: Theoretical basis for communication, Fourier analysis, Band limited signals, Maximum data rate of a channel: Transmission impairments, Attenuation distortion, Delay distortion, Dispersion, Noise: Data transmission modes, Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission:

UNIT V

Transmission Medium: Introduction: Transmission medium, Guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Comparison of fiber optics and copper wire: Wireless transmission.

Suggested Books:

1. W. Stallings, "Data and Computer Communication", Pearson Education.
2. A. S. Tanenbaum, "Computer Network", 4th, Edition, Pearson Education.
3. Forouzan, "Data Communication and Networking", 2nd Edition, Tata McGraw Hill.

RB070902-Software Engineering

Unit I

Introduction to Software Engineering: Software development life cycle, project size and its categories. Software team Structure-democratic, chief programmer and hierarchical team structures, project control, Life cycle models-Spiral model, Waterfall model, Prototyping model, Software cost estimation techniques-Expert judgment, Delphi cost estimation techniques, WBS cost estimation techniques, COCOMO model.

Unit II

Software Design: fundamental design concepts, abstraction, information hiding, structure, modularity, modules and modularization criteria, coupling and cohesion. Design-notations- data flow diagrams, structure charts, HIPO diagrams, procedure templates, pseudo codes, structured flowcharts, structured english, decision tables. Design techniques-stepwise refinement, structured design, integrated top-down development, Object oriented design concept and methods, class and object definition, refinery operation.

Unit III

Software Quality Assurance: quality concepts, metrics for software quality, software quality assurance, SQA activities, software reviews, formal technical reviews, software reliability.

Unit IV

Software testing techniques: Software testing fundamentals, white box testing, basis path testing, control structure testing, black box testing. Software testing strategies: strategic approach to software testing, unit testing, integration testing, validation testing, system testing.

Unit V

Computer Aided Software Engineering: building blocks for CASE, taxonomy of CASE tools, Integrated CASE environments. Brief introduction to Ada and features relevant to software engineering.

RB070903-Data Structure Using 'C'/'C++'

UNIT-I

Classification of Data Structure, Operations on Data Structure, Address Calculation, Application of arrays, Limitation of Array, Application of Arrays, Array as Parameters, Sparse Matrices

UNIT-II

Continuous Implementation (Stack): Array Representation, Operations on Stacks: Push & Pop, Applications of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack Recursion: Recursive Definition and Processes, Principles of Recursion, Tower of Hanoi Problem, Recursion Vs. Iteration Continuous. Implementation (Queue): Array representation and implementation of Queues, Operations on Queue: Create, Add, Delete, Full and Empty Queue, Circular Queue, Dequeue and Priority Queue

UNIT-III

Non Continuous Implementation: Link Lists: Linear List concept, Linked List Terminology, Representation of Linked List in Memory, Types of Linked List, Single Linked List, Doubly Linked List, Single Circular Linked list, Circular Doubly Linked List, Operations on Link List: Create List Insert node (empty list, beginning, middle, end), Delete node (first, general case), Traversing node, Searching node, Print list, Count Nodes, Sort Lists

UNIT-IV:

Trees: Introduction to Tree & its Terminology, Binary trees, Types of Binary trees, Representation of Binary Tree, Traversals (Inorder, Preorder, Postorder), Tree Expression, Binary Search Tree, Insertion and Deletion in BST.

UNIT-V:

Sorting & Searching Techniques: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Sequential Search, Binary Search

Suggested Readings:

1. S. Lipschutz, "Data structures", Mc, Graw, Hill International Editions, 1986.
2. A. Michael Berman, "Data Structures via C++", Oxford University Press, 2002.
3. M. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education

RB070904-System Analysis and Design

UNIT-I

Overview of Systems Concepts, Analysis and Design Life cycle, Introduction to System Concept: Characteristics of the system, Elements of a System, Types of Systems, Physical and Abstract System, Open and Closed System, Formal and Informal System, Introduction to Data And Information: Types of Information System, Categories of Information System, Needs of Information Systems, Qualities of Information System, Software Development Life Cycle (SDLC), Role and Attributes of System Analyst.

UNIT-II

System Planning and Requirements Determination System planning and initial investigation: Strategic Plan for Information processing, Tools for Planning, Problems in Planning, Need for requirement definition.

UNIT-III

Information gathering tools: Review of Literature, procedures and forms, Methodologies, Tools and Techniques of Analysis Systems Analysis and Design: Decision Tree, Data Dictionary, Decision Table, Structured English, Data Flow Diagram, Components of a DFD, Zero Level DFD, DFD Transformation and Decomposition, Context Diagram, Levelling a DFD, Feasibility Study: Economic Feasibility (Cost & Benefit Analysis), Organizational Feasibility, Technical Feasibility, Behavioural Feasibility study.

UNIT-IV

System Design and Implementation Process of Design: Logical and Physical Design, Design Methodologies, Elements of Form Design, Design of Output, Design of Input, Design of File, Design of procedure, Audit Trail, System Implementation and Testing: Operational and Test Environment, Conversion Preparation, Database installation, Users Training and Final Report to Management, Creating a new System, Test Plan: Activity Network for system Testing, Types of Testing.

UNIT-V

System Quality Assurance, IT infrastructure Selection and Evaluation of Processing and Maintenance Quality Assurance: Quality factors specifications, Levels of Quality Assurance, Computer Hardware and Software Selection, Computer Configuration Determination, Requesting Proposal from Vendors, Evaluation of Vendor's Proposals, Acceptance of system, Evaluation of Processing, Need of Maintenance.

Suggested Books:

1. V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
2. J.A. Senn, "Analysis and Design of Information Systems"
3. J.K.Whiten, L.D.Bentley, V.M.Beslow, "System Analysis and Design Methods",

RB070905-Statistical Method and Application

UNIT I

Classification of data, Tabulation of data, Preparation of frequency distribution, Presentation of data through histogram, frequency polygon, frequency curve

UNIT II

Measures of Central Tendency: Computation of Arithmetic mean, median and mode for ungrouped data and grouped data, Verification of median through ogives.

UNIT III

Measures of dispersion: Computation of Range, Quartile deviation, mean deviation and Standard deviation, coefficient of variation. (Numerical Applications Only)

UNIT IV

Concept of Skewness, Karl Pearson's and Bowley's Coefficients of Skewness(Numerical Applications Only)

UNIT V

Meaning of Correlation, types of correlation, correlation coefficient, Karl Pearson, spearman's rank correlation coefficient. (Numerical Applications Only)

Suggested Books:

1. Statistical Methods, "Dr.S.P. Gupta, SultanChand&Sons".
2. Quantitative Techniques by "C. Sathyadevi,S. Chand".
3. Fundamental of Mathematical Statistics, "S.C.Gupta& V.K.Kapoor, Sultan Chand"
4. Statistical Methods, "SnedecorG.W.&CochranW.G.oxford&+DII"
5. Elements of Statistics, "Mode.E.B., PrenticeHall"

FOURTH SEM

RB071001-Java Programming

UNIT-I

Introduction, Java Tokens, Java Statements, Command Line Arguments, Programming Style. Constants, Variables and Data Types Constants, Variables, Data Types, Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Program Structure, Java Virtual Machine.

UNIT-II

Operators, Expressions and Statements: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if... else Statement, Nesting of if ... else Statements, else if Ladder, switch Statement, ?: Operator. Decision Making and Looping: Introduction, while Statement, do Statement, for Statement.

UNIT-III

Classes, Objects and Methods: Defining a Class, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control. Arrays, One, Dimensional Arrays, Creating an Array, Two Dimensional Arrays, Strings, Vectors, Wrapper Classes.

UNIT-IV

Interfaces and Packages: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. Packages: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization.

UNIT-V

Applet Programming: Introduction, How Applets Differ from Application, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More About Applet Tag. Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.

Suggested Books:

- 1.E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.
- 2.P.Naughton and H. Schildt, JAVA: The Complete Reference, TMH, New Delhi
- 2005.3.D.Jana, Java and Object Oriented Programming Paradigm, PHI, New Delhi, 2005

RB071002-Computer Graphics

UNIT I

Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Application Development of Hardware and software for computer Graphics, Conceptual Framework for Interactive Graphics: Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

UNIT II

Hardcopy Technologies, Display Technologies, Raster, Scan Display System, Video Controller, Random, Scan Display processor, Input Devices for Operator Interaction, Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc, Clipping Southland, Cohen Algorithm, Cyrus, Beck Algorithm, Midpoint Subdivision Algorithm

UNIT III

Geometrical Transformation: 2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, composition of 2D Transformations, the Window to Viewport Transformations, Introduction to 3D Transformations Matrix.

UNIT IV

Representing Curves & Surfaces: Polygon meshes parametric, Cubic Curves, Quadric Surface. Solid Modeling: Representing Solids, Regularized Boolean Set Operation primitive Instancing Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry Comparison of Representations.

UNIT V

Introductory Concepts: Multimedia Definition, CD-ROM and the multimedia highway, Computer Animation (Design, types of animation, using different functions) UNIT-VI Uses of Multimedia, Introduction to making multimedia, The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage

Suggested Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & practice, 2000.
2. D.J. Gibbs & D.C. Tsichritz: Multimedia programming Object Environment & Framework, 2000.
3. D. Haran & Baker. Computer Graphics Prentice Hall of India, 1986

RB071003-Optimization Techniques

UNIT-I

Basics of operation research (OR): Characteristics of OR, Necessity of OR in industry, OR and decision making, role of computers in OR. Linear Programming: Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem.

UNIT-II

Algebraic solution: Simplex methods, Charnes method of penalties, two phase simplex method.

UNIT-III

Transportation Model: Definition, formulation and solution of transportation models, The row, minima, column, minima, matrix, minima and Vogel's approximation methods. Assignment model: Definition of assignment model, comparison with transportation model, formulation and solution of assignment model.

UNIT-IV

Sequencing Problem: Processing of n jobs through 2 machines, processing n jobs through 3 machines, processing 2 jobs through m machines.

UNIT-V

Game Theory: Characteristics of games, maxima, minimax criteria of optimality, dominance property, algebraic and graphical method of solution of solving 2 x 2 games.

Suggested Books:

1. Introduction to Management Science Operations Research, "KantiSwarup".
 2. Operations Research Quantitative Techniques For Management, "V. K. Kapoor".
- Nonlinear Programming: Theory and Algorithms "by Mokhtar S Bazara and C M Shetty".

RB071004-E-Commerce and ERP

UNIT-I

Introduction: Defining E-Commerce, Main Activities of Electronic Commerce, Benefits of E-Commerce, Goals of Electronic Commerce, Main Components of E-Commerce, Functions of Electronic Commerce, Communication, Process Management, Service Management, Transaction Capabilities, Process of E-Commerce, Types of E-Commerce, Role of Internet and Web in E-Commerce, Technologies Used in E-Commerce Systems, Scope of E-Commerce, E-Business Models.

UNIT-II

E-Commerce Activities: Various Activities of E-Commerce, Various Modes of Operation Associated with E-Commerce, Matrix of E-Commerce Types, Elements and Resources Impacting E-Commerce and Changes, Types of E-Commerce Providers and Vendors, Man Power Associated with E-Commerce Activities, Opportunity Development for E-Commerce Stages, Development of E-Commerce Business Case, Components and Factors for the Development of the Business Case, Steps to Design and Develop an E-Commerce Website.

UNIT -III

Internet :The Backbone for E-Commerce: Early Ages of Internet, Networking Categories, Characteristics of Internet, Components of Internet, Internet Services, Elements of Internet, Uniform Resource Locators, Internet Protocol, Shopping Cart, Cookies and E-Commerce, Web Site Communication, Strategic Capabilities of Internet. Implementation of E-Commerce: WWW.EBAY.COM, B2C Website- Registration, Time factor, Bidding process, Growth of eBay, PayPal, New Trend in Making Payments Online- National Electronic Funds Transfer.

UNIT-IV

ISP, WWW and Portals: Internet Service Provider (ISP), World Wide Web (WWW), Portals, Steps to build homepage, Metadata, Advantages of Portal, Enterprise Information Portal (EIP).E-Marketing: Traditional Marketing, E-Marketing, Identifying Web Presence Goals, Achieving web presence goals, Uniqueness of the web, Meeting the needs of website visitors, Maintaining a Website, Metrics Defining Internet Units of Measurement, Online Marketing, Advantages of Online Marketing. Content: format and access, Maintaining a Website- Metrics Defining Internet Units of Measurement, Online Marketing, Advantages of Online Marketing. E-Security: Security on the Internet, Network and Website Security Risks, Denial, of, Service attacks, Viruses, Unauthorized access to a computer network, Vulnerability of Internet Sites, Network and Website Security, Transaction security and data protection, Security audits and penetration testing, E-Business Risk Management Issues, Firewall, Network policy, Advanced authentication mechanism, Packet filtering, Application gateways, Defining Enterprise Wide Security Framework.

UNIT -V

E- Payment Systems: Electronic Funds Transfer, Digital Token Based E- Payment Systems, Modern Payment Systems, Steps for Electronic Payment, Payment Security, Net Banking, Customer Relationship Management: Customer Relationship Management (CRM), Marketing automation, Enterprise customer management, Customer Relationship Management Areas, CRM Processes, Event triggers, business logic and rules repository²⁰,

Decision support tools, Higher level statistical analysis, Forecasting and planning tools, True channel management, Workflow management, Collateral management, Electronic Customer Relationship Management, Need, Architecture and Applications of Electronic CRM.

Suggested Books:

1. The Story of India's First E-Commerce Company" by K Vaitheeswaran"
2. E – Commerce: Strategy, Technologies and Applications" by David Whiteley"
3. E-Commerce: An Indian Perspective" by P T Joseph"

RB071005-Design and Analysis of Algorithm

UNIT-I

Basic Concepts of Algorithms: Definition of algorithm, Characteristic of algorithm, Pseudo Codes & Time Complexity of Basic Control Structures, Time and Space Complexity of Insertion Sort, Selection Sort, Heap Sort, Bubble Sort, Asymptotic Notations (Growth of Functions).

UNIT-II

Divide and conquer: Binary Search, Maximum & Minimum, Merge Sort, Quick Sort, Greedy Method: General method, Knapsack Problem, Job Sequencing with deadline- Optimal Storage on tapes, Huffman Codes.

UNIT-III

Dynamic Programming: Matrix, Chain Multiplications, Longest Common Subsequence- Backtracking: General method, N Queens Problem, Sum of subsets.

UNIT-IV

Basic Traversals and search techniques, techniques of binary trees, techniques of graphs: BFS, DFS.

UNIT-V

Analysis of Graph Algorithms: Elementary Graph Algorithms, Multistage Graphs, Minimum Spanning Trees: Kruskal's & Prim's Algorithm, Single Source Shortest Path, Dijkstra's & Bellman Ford, All Pairs Shortest Path: Warshal Algorithm.

Suggested Books:

1. Thomas H. Cormen, "Introduction to Algorithms", PHI.
2. Horowitz & Sahani, "Fundamental of Algorithms", Galgotia.
3. Aho, "Design & Analysis of Computer Algorithms", Pearson.
4. Johnson baugh, "Algorithms", Pearson.