

4th Semester (Code-401 Java Programming)

Unit-1

Java Basics: History of Java, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple Java program, concept of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes.

Unit-2

Inheritance: Hierarchical abstractions, Base class object, sub-class, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, member access rules, super uses, using final with inheritance, Polymorphism-method overriding, abstract classes, the object class.

Unit-3

Packages and Interfaces: Defining, creating, and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining, implementing, applying interfaces, variables and extending in interfaces, Exploring java.io.

Unit-4

Exception Handling: Concepts of exception handling, benefits of exception handling, usage of try, catch, throw, throws and finally, built in exceptions, creating own exceptions sub classes, Exploring java.util.

Unit-5

Multi-threading: Differences between multi-threading and multi-tasking, thread life cycle, creating threads, autoboxing, Event Handling: Events, Event classes, Event Listeners, event model, handling mouse and keyboard events, The AWT class hierarchy, Concepts of Applets, Life cycle of an applet, types of applets, creating applets, Swing: Introduction, limitations of AWT, JApplet, JFrame, JComponent, Icons, Labels, Text fields, and buttons.

4th Semester (Code-402 System Analysis And Design)

Unit-1

The System Concept: Definition, Characteristics of systems, Elements of a System, Open and Closed System, Formal and Informal Information Systems, Computer Based Information Systems, Decision Support System, General Business, Knowledge, Management Information System, and Interpersonal Communicational System, Physical or Abstract Systems.

Unit-2

System Analysis and Design Life Cycle: SDLC, Requirements specifications, Feasibility Analysis, Final Specifications, Hardware and Software study, Roles of systems analyst, Attributes of Systems Analyst.

Unit-3

System Analysis: System Planning and Initial Investigation, Information Gathering Tools, Tools used in System Analysis Information: Data Flow Diagram, case study for use of DFD, good conventions, Leveling of DFDS, Logical and Physical DFDS, The Structured and unstructured DFDS.

Unit-4

System Designs: Logical and physical Designs, Design Methodologies, Structured Design, Input/Output and Forms Design: Input design, output design, Requirements of form designs, screen designs, graphical user interfaces, interactive I/O terminals.

Unit-5

System Implementation: System Testing and Validation, System Quality Assurance, Levels of Quality Assurance, Relationship Between Design and Implementation: Implementation issues and programming support environment, coding the procedural issues, System Maintenance, Maintenance Activities and issues.

4th Semester (Code-403 Computer Based Numerical And Statistical Techniques)

Unit-1

Floating point Arithmetic: Representation of floating-point numbers, Operations Normalisation, Pitfalls of Floating-Point representation, Errors in numerical computation, Iterative Methods: Zero of a single transcendental equation and zeros of polynomial using Bisection Method, Regula-Falsi method, Newton Raphson Method.

Unit-2

Simultaneous Linear Equations: Solution of a System linear equations, Difference tables Polynomial Interpolation: Newton's forward and backward formula. Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula.

Unit-3

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Solution of Differential Equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, stability of solution.

Unit-4

Curve Fitting, Cubic Spline and Approximation: Method of least squares, fitting of straight lines, polynomials, Frequency Chart: Different frequency chart like Histogram, Frequency Curve. Pi-chart, Regression Analysis: Linear and non-linear regression.

Unit-5

Time series and forecasting: Moving averages, smoothening of curves, forecasting models and methods. **Statistical Quality Controls Methods Testing of hypothesis:** Test of significance, Chi-square test, t-test, ANOVA, F-test Application of medicine, agriculture etc.

4th Semester (Code-404 Unix And Shell Programming)

Unit-1

The Unix Operating System, LINUX and GNU, The UNIX Architecture, Features of UNIX, Advantages and Disadvantages of Buffer cache. User's Perspective, O/S services, assumption about hardware, The Kernel and buffer cache Architecture of UNIX OS.

Unit-2

Understanding UNIX Command: Locating commands, Internal and external commands, Command Structure, Flexibility of usage. INODES, Structure of regular, Directories Conversions of a path name to an inode, Super block, Inode assignment to a new file.

Unit-3

General Purpose Utilities: man, cal, dat, echo, printf, bc, script .sc, passwd, who, uname, tty Process states and Transition layouts of system memory, the context of a process, manipulation of a process address space, Sleep process creation/termination, The user-id of a process, Changing the size of the process, THE SHELL.

Unit-4

Introduction to SHELL scripts: Types of shells, Shell Functionality, shell Bourne shell, C shell, Unix Commands, permissions, editors, filters sed, grep family, shell variables, scripts, metacharacters and environment, if and case statements, for while until loops, Shell programming.

Unit-5

Awk Programming: FILTERS, pr, head, tail, cut, paste, grep, egrep, sort, uniq, tr., logical operators, Condition Execution, Evaluation of Expression LINUX: History and Features of LINUX, LINUX Structure, various flavours of LINUX.

4th Semester(Code-405 Graph Theory)

Unit-1

Graphs, subgraphs, some basic properties, various examples of graphs and their subgraphs, walks, path & circuits, connected graphs, disconnected graphs and component.

Euler's Graphs, Various operations on graphs, Hamiltonian Paths and circuits, the travelling salesman problem.

Unit-2

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, Algorithms of prims, Kruskal and Dijkstra.

Unit-3

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows, Planar Graphs, Combinatorial and Geometric Duals: Kuratowski graphs, detection of planarity, Geometric Duals.

Unit-4

Vector space of a graph and vectors, cut set vector, circuit vector, circuit and cut space subspaces, Matrix Multiplication of a Graph, Basic Concepts, Incidence Matrix, Circuit Matrix, Path Matrix, Cut-set Matrix & Adjacency Matrix.

Unit-5

Coloring, Covering and partitioning of a graph, Chromatic Number, Chromatic Partitioning, Chromatic Polynomials, Matching, Covering, 4 color problem.