## I YEAR  I SEMESTER

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<thead>
<tr>
<th>Subject</th>
<th>Hours/Week</th>
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<tbody>
<tr>
<td>Mathematical Foundations of Computer Science</td>
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<tr>
<td>Advanced Data Structures and Algorithms</td>
<td>4</td>
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<tr>
<td>Computer System Design</td>
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<tr>
<td>Java and Web Technologies</td>
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<tr>
<td>Software Engineering</td>
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<tr>
<td>Elective-I</td>
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<tr>
<td>a. Advances in Databases</td>
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<tr>
<td>b. Distributed Databases</td>
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<tr>
<td>c. Computer Vision</td>
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<tr>
<td>Software Lab- 1 (Covering the experiments: Data structures &amp; Algorithms and Web Technologies)</td>
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## I YEAR  II SEMESTER

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours/Week</th>
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<tbody>
<tr>
<td>Object Oriented Analysis and Design</td>
<td>4</td>
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<tr>
<td>Advanced Computer Networks</td>
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<tr>
<td>Distributed Systems</td>
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<tr>
<td>Software Quality Assurance and Testing</td>
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<tr>
<td>Data Warehousing and Mining</td>
<td>4</td>
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<tr>
<td>Elective-II</td>
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<tr>
<td>a. Software Architecture</td>
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<tr>
<td>b. Software Design</td>
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<tr>
<td>c. Design Patterns</td>
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<tr>
<td>Software Lab- 2 (Covering the experiments: OOAD &amp; Data Warehousing and Mining)</td>
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## II YEAR  (III & IV Semesters)

<table>
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<th>SUBJECTS</th>
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<tr>
<td>Seminar</td>
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<tr>
<td>Project work</td>
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</tbody>
</table>
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT I
Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus

UNIT II
Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving
Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT III

UNIT IV
Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and monoids, groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

UNIT V

UNIT VI

UNIT VII
Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs

UNIT VIII
Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

TEXT BOOKS:
1. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH

REFERENCE TEXTBOOKS:
1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
2. Discrete Mathematics, Schaum’s Outlines, Lipschutz, Lipson, TMH.
6. Discrete Mathematics for computer science, Bogart, Stein and Drysdale, Springer, 2005
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
M.Tech (Computer Science & Engineering)
I YEAR I SEMESTER
ADVANCED DATA STRUCTURES AND ALGORITHMS

UNIT I : Overview of Data Structures
Review of Arrays, Stacks, Queues, linked lists , Linked stacks and Linked queues, Applications

UNIT II: Algorithm Analysis
Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

UNIT III: Trees and Graphs
Introduction, Definition and Basic terminologies of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs-basic concepts, representation and traversals.

UNIT IV: Binary Search Trees, AVL Trees and B Trees

UNIT V: Red – Black Trees, Splay Trees and Hash Tables

UNIT VI: Divide – and – Conquer & Greedy Method

UNIT VII: Dynamic Programming
General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 / 1 Knapsack problem, Reliability Design, Traveling Sales Person’s Problem.

UNIT VIII: Back Tracking and Branch – and – Bound
General Method, 8 – Queen’s Problem, Graph Coloring. Branch – and – Bound: The Method, LC Search, Control Abstraction, Bounding, 0 / 1 Knapsack Problem.

TEXT BOOKS:

REFERENCE BOOKS:
1. Classic Data Structures by D. Samanta, 2005, PHI
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.
M.Tech (Computer Science & Engineering)
I YEAR   I SEMESTER

COMPUTER SYSTEM DESIGN

UNIT I
Computer structure – hardware, software, system software, Von-neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines.

UNIT II
Input/Output organization - interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers

UNIT III
Processing Unit - Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control.

UNIT IV
Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, RISC architecture introduction.

UNIT V
Memory: types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies.

UNIT VI
Processes and Threads: processes, threads, inter process communication, classical IPC problems, Deadlocks.

UNIT VII
File system: Files, directories, Implementation, UNIX file system

UNIT VIII
Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

TEXT BOOKS:

REFERENCE BOOKS:
Unit I:
**HTML Common tags** - List, Tables, images, forms, Frames; Cascading Style sheets;
Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

Unit II:
**XML**: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

Unit III:
Review of Applets, Class, Event Handling, AWT Programming.
Developing a Home page using Applet & Swing.

Unit IV:
**Java Beans**: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API.

Unit V:
Web servers: Tomcat Server installation & Testing.

Unit VI:
**More on Servelets**: The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.
Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture. AJAX.

Unit VII:
**JSP Application Development**: Generating Dynamic Content, Using Scripting Elements
Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

Unit VIII:
**Database Access**: Database Access, Database Programming using JDBC Studying Java.sql.* package
Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page
TEXT BOOKS:
1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT 1,2)
2. The complete Reference Java 2 Fifth Edition, Patrick Naughton and Herbert Schildt., TMH (Chapters: 25) (UNIT 2,3)
3. Java Server Pages –Hans Bergsten, SPD O’Reilly (UNITs 3,4,5)

REFERENCE BOOKS:
1. Programming world wide web-Sebesta, Pearson

SERVLETS AND JAVA SERVER PAGES VOLUME 1: CORE TECHNOLOGIES, Marty Hall and Larry Brown Pearson
SOFTWARE ENGINEERING

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:

UNIT-V:
Performing User Interface Design: Golden rules, User interface analysis and design, interface analysis, interface design steps. Pattern Based Design: Design patterns, Pattern based software design, Architectural patterns, Component level design patterns, User interface design patterns.

UNIT-VI:
Testing: Software testing strategies: A strategic approach to software testing, Test strategies (Unit testing and integration testing) for conventional and object oriented software, Validation testing, System testing, The art of debugging.
UNIT-VII:

**Testing Conventional Applications:** Software testing fundamentals, **White-Box testing:** basis path testing, condition (predicate) testing, data flow testing, loop testing, **Black box testing:** Equivalence partitioning, Boundary value analysis, Graph based testing methods.

**Testing Object Oriented Applications:** OO testing methods, Testing methods applicable at class level, Interclass test case design.

UNIT-VIII:

**Umbrella Activities :**
Risk management, Software quality assurance, Software configuration management, **Measurement and metrics:** Size oriented metrics, Function oriented metrics, Metrics for software quality, **Product metrics:** Metrics for the requirements model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**Software Reengineering:** A software reengineering process model, Software reengineering activities.

TEXT BOOKS:

REFERENCE BOOKS:
M.Tech (Computer Science & Engineering)
I YEAR  I SEMESTER
ADVANCES IN DATABASES

ELECTIVE-1

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
UNIT VI


UNIT VII


UNIT VIII


Text Books:


Reference books:

UNIT-I: Introduction
Features of Distributed databases, Features of Centralized databases, Level of Distributed Transparency, Reference Architecture, Types of Data Fragmentation, Distribution Transparency, access primitives, integrity constraints

UNIT-II: Distributed Database Design
A framework for Distributed Database Design, Design of Database Fragmentation, Allocation of fragments

UNIT-III: Global And Fragment Queries
Global Queries, fragment Queries, Equivalence Transformations for Queries, transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parameter Queries

UNIT-IV: Optimization Of Access Strategies
Frame Work for Query Optimization, Join Queries, General Queries

UNIT-V: Management Of Distributed Transactions
Framework for Transaction Management, Atomicity of Distributed Transactions, Concurrence Control for Centralized Database.

UNIT-VI: Concurrency

UNIT-VII: Reliability
Basic concepts, Commitment Protocols, reliability and Concurrency Control, Consistent View of Network, detection and Resolution of Inconsistency, Check points and cold restart

UNIT-VIII: Distributed Database Systems Commercial Systems
Commercial Systems, Tanden’s ENCOMPASS Distributed Database systems, IBM’s inter system Communication, features of Distributed, INGRESS HETEREGENEOUS DATABASE : General problems, brief study of MULTIBASE.

TEXT BOOKS:
2. Ozsu, “ Principles of Distributed Database Systems” , 1e, 2002, PEA.
UNIT-1
CAMERAS: Pinhole Cameras, Camera with Lenses, the Human Eye, Sensing.
RADIOMETRY-MEASURING LIGHT: Light in Space, Light at Surfaces, Important Special Cases.

UNIT-2
SOURCES, SHADOWS, AND SHADING: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Inter reflections: Global Shading Models.

UNIT-3
LINEAR FILTERS: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Technique: Normalized Correlation and Finding Patterns, Technique: Scale and Image Pyramids.

UNIT-4

UNIT-5
SEGMENTATION BY CLUSTERING: What is Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering.

UNIT-6
SEGMENTATION BY FITTING A MODEL: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as Probabilistic Inference Problem, Robustness, Example: Using RANSAC to Fit Fundamental Matrices, Missing Data Problems, the EM Algorithm.

UNIT-7
FINDING TEMPLATES USING CLASSIFIERS: Method for Building Classifiers, Building Classifiers from Class Histograms, Feature Selection, Neural Networks, the Support Vector Machine.

UNIT-8

TEXT BOOK:

REFERENCE BOOKS:
OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT I
Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

UNIT II
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT III
Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.

UNIT IV
Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams.
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT V
The Unified process: use case driven, architecture centric, iterative, and incremental
The Four Ps: people, project, product, and process
Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases
Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

UNIT VI
Iterative incremental process: iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.
The Generic Iteration workflow: phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases

UNIT VII
Inception phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.
Elaboration Phase: elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.

UNIT VIII
Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.
Transition phase: early in the transition phase, activities in transition phase
Case Studies: Automation of a Library, Software Simulator application (2-floor elevator simulator)
TEXT BOOKS:
2. UML 2 Toolkit By Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado WILEY-Dreamtech India Pvt. Ltd.
3. The Unified Software Development Process By Ivar Jacobson, Grady Booch, James Rumbaugh, Pearson Education

REFERENCE BOOKS:
1. Fundamentals of Object Oriented Design in UML By Meilir Page-Jones, Pearson Education
3. Practical Object-Oriented Design with UML By Mark Priestley, TATA McGrawHill
4. Object Oriented Analysis & Design By Brett D McLaughlin, Gary Pollice and David West, O’REILY.
7. UML and C++, R.C.Lee, and W.M.Tepfenhart, PHI.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech (Computer Science & Engineering)
I YEAR   II SEMESTER

ADVANCED COMPUTER NETWORKS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

UNIT VI
Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

UNIT VII
VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol
UNIT VIII

TEXT BOOKS:

REFERENCE BOOKS:
DISTRIBUTED SYSTEMS

UNIT-I
Introduction Of Distributed System: Goals, Hardware Concepts, Software Concepts, the Client-Server Model.

UNIT-II
Communication: Remote Procedure Call, Remote Object Invocation, Message Oriented Communication, Stream-Oriented Communication.

UNIT-III
NAMING: Naming Entities, Locating Mobile Entities.

UNIT-IV
Synchronization: Clock Synchronization, Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions.

UNIT-V

UNIT-VI

UNIT-VII
Distributed Object-Based Systems: CORBA, Distributed COM

UNIT-VIII

Text Books

Reference Books
UNIT I

UNIT II

UNIT III
Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, Implement the software quality metrics, analyze software metrics results, validate the software quality metrics – Software quality indicators – Fundamentals in Measurement theory

UNIT IV
Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing

UNIT V
Software Testing Methodology
Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

UNIT VI
Software Testing Techniques
Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

UNIT VII
Software Testing Tools
Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Winrunner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus.
UNIT VIII
Testing Process


Testing Specialized Systems and Applications
Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse

TEXT BOOKS:


REFERENCE BOOKS:

M.Tech (Computer Science & Engineering)
I YEAR II SEMESTER

DATA WAREHOUSING AND MINING

UNIT-I:
Introduction: Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Primitives, Major Issues in Data Mining.

UNIT-II:
Data Preprocessing: Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT-III:
Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.

UNIT-IV:
Mining Frequent Patterns and Associations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules.

UNIT-V:
Classification and Prediction: Issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, Rule based classification, Prediction, Accuracy and Error Measures.

UNIT-VI:
Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density based Methods, Grid based methods, model based clustering methods, Clustering high dimensional data, Outlier analysis.

UNIT-VII:
Mining Stream, Time-Series, and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Biological Data.

UNIT-VIII:
Applications and Trends in Data Mining: Data Mining Applications, : Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in Other Scientific Applications, Data Mining for Intrusion Detection, Social Impacts of Data Mining.

TEXT BOOKS:

REFERENCE BOOKS:
1. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education, 2e, 2006.
SOFTWARE ARCHITECTURE
ELECTIVE-II

UNIT-I:
Introduction To Software Architecture

UNIT-II:
Architecture Styles
Pipes and Filters, Data Abstraction and Object Oriented organization, Even-based Implicit Invocation, Layered Systems, Registers, Interpreters, Process Control, Other Familiar Architectures, Heterogeneous Architectures.

UNIT-III:
Shared Information Systems

UNIT-IV:
Architectural Design Guidance

UNIT-V:
Pattern Types
Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems

UNIT-VI:
Formal Models And Specifications

UNIT-VII:
Architectural Description Languages
ADL’s today, capturing Architectural Information in an ADL, Application of ADL’s in system Development, Choosing an ADL, Example of ADL.

UNIT-VIII:
Reusing Architectural Assets Within An Organization
Creating Products and Evaluating a Product Line, Organizational Implications of a Product Line, Component Based Systems. Software Architectures in Figure: Legacy Systems. Achieving an Architecture, from Architecture to System.
TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I:
The Nature of Design Process
What is design?, The role of the design activity, Design as a problem-solving process, Design as a ‘wicked’ problem.

The Software Design Process
What is software?, Building models, Transferring design knowledge, Constraints upon the design process and product, Recording design decisions, Designing with others

UNIT-II:
Design In The Software Development Process

Design Qualities
The quality concept, Assessing design quality, Quality attributes of the design product, Assessing the design process.

UNIT-III:
Describing A Design Solution
Representing abstract ideas, Design viewpoints for software, Forms of notation.

Transferring Design Knowledge
The need to share knowledge, The architecture concept, Design methods, Design Patterns, A unified interpretation.

UNIT-IV:
Some Design Representations
A problem of selection, Black box notations, White box notations, Development a diagram.

The Rationale For Method
What is a software design method? The support that design methods provide, Why methods don’t work miracles, Problem domains and their influence.

UNIT-V:
Design Process And Design Strategies
The role of strategy in methods, Describing the design process-the D- Matrix, Design by top-down decomposition, Design by composition, Organizational influences upon design.

Design Patterns
Design by template and design reuse, The design patterns, Designing with Patterns, Patterns in the wider design context.
UNIT-VI:
Stepwise Refinement
The historical role of stepwise refinement, Architecture consequences, Strengths and weaknesses of the stepwise strategy.

Incremental Design
Black box to white box in stages, Prototyping, An example-DSDM.

Structured Systems Analysis And Structured Design
Origins, development and philosophy, Representation forms for SSA/SD, The SSA/SD process, The role of heuristics in SSA/SD, External forms of SSA/SD, SSA/SD: an outline

Example

UNIT-VII:
Jackson Structured Programming (JSP)
Some background to JSP, JSP representation forms, The JSP process, Some JSP heuristics.

Jackson System Development (JSD)
The JSD model, JSD representation forms, The JSD Process, JSD heuristics

UNIT-VIII:
Design With Objects
The ‘object concept’, Design Practices for the object-oriented paradigm, Object-Oriented frameworks, Object-based design, Object-Oriented design.

Component-Based Design
The component concept, Designing with components, Designing components, At the extremity-COTS.

A Formal Approach to Design
The case for rigour, Model-based strategies, Property-based strategies

TEXT BOOKS:

1. Software Design, by David Budgen 2/e Pearson Education.
UNIT-I:
Review Of Formal Notations & Foundation Classes In C++
Class diagram, Object diagram, Interaction diagram Examples. List, Iterator, ListIterator, Point, Rect, coding in C++

UNIT-II:
Introduction To Design Patterns
Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, use of Design Patterns.

UNIT-III:
Designing A Document Editor: A Case Study
Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

UNIT-IV:
Design Patterns Catalog
Creational Patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton. Discussion of Creational Patterns.

UNIT-V:
Structural Patterns-1
Adapter, Bridge, Composite, Decorator.

UNIT-VI:
Structural Patterns-2 & Behavioral Patterns-1

UNIT-VII:
Behavioral Patterns-2

UNIT-VIII:
Behavioral Patterns-3
TEXT BOOKS:
1. Gamma, Belm, Johnson, “Design Patterns: Elements of Reusable Object Oriented Software”, 1995, PEA.

REFERENCE BOOKS:
4. Larman, “Applying UML Patterns”, PEA.