

**UNIT I****Chapter 1 : Introduction****1-1 to 1-39****Syllabus :**

Introduction to software design, design methods-procedural / structural and object oriented, Requirement Vs Analysis Vs Architecture Vs Design Vs Development 4+1 Architecture, case study of transferring requirement to design, UP, COMET use case based software life cycle, Introduction to UML -Basic building blocks, Reusability, Use case modelling, Use case template Case study – Transferring requirements into design using advanced tool.

1.1	Introduction to Software Design .....	1-1
1.1.1	Software Design Levels .....	1-1
1.1.2	Design Concepts .....	1-2
1.2	Design Methods .....	1-6
1.2.1	Procedural Design /Structured Design .....	1-6
1.2.2	Object Oriented Design .....	1-6
1.2.3	Structured Analysis and Design vs. Object-Oriented Analysis and Design .....	1-8
1.2.4	Software Design Approaches .....	1-10
1.3	Requirement vs. Analysis vs. Architecture vs. Design vs. Development.....	1-11
1.3.1	Requirement vs. Analysis .....	1-12
1.3.2	Architecture vs. Design .....	1-13
1.3.3	Design vs. Development .....	1-13
1.4	4+1 View Architecture .....	1-13
1.4.1	Why is it Called the 4 + 1 Instead of just 5? ....	1-14
1.4.2	4+1 View of UML Diagrams.....	1-15
1.4.3	Why 4+1 Architecture.....	1-16
1.5	Unified Process Model .....	1-16
1.5.1	Difference between Unified Process and Waterfall Model .....	1-18
1.6	COMET Use Case based Software Life Cycle .....	1-18
1.7	Reusability.....	1-20
1.8	Unified Modelling Language.....	1-20

1.8.1	Introduction to Unified Modelling Language .....	1-21
1.8.2	UML Supports Requirements Modelling.....	1-21
1.8.3	Building Blocks of the UML .....	1-22
1.8.3(A)	Things in UML .....	1-22
1.8.3(B)	Relationship in UML .....	1-25
1.8.3(C)	Diagrams in UML .....	1-25
1.9	Use Case Modelling.....	1-26
1.9.1	Use Case Diagram.....	1-26
1.9.2	Elements of a Use Case Diagram.....	1-27
1.9.3	Relationships in Use Cases .....	1-30
1.9.3(A)	Include Association .....	1-30
1.9.3(B)	Extend Association.....	1-31
1.9.4	Use Case Specification .....	1-32
1.10	Use Case Template .....	1-34
1.11	Solved Examples .....	1-35

**UNIT II****Chapter 2 : Static Modelling****2-1 to 2-46****Syllabus :**

Analysis Vs Design, Class diagram- Analysis - Object and classes finding analysis and Design-design classes, refining analysis relationships, Inheritance and polymorphism, Object diagram, Component diagram- Interfaces and components, deployment diagram, Package diagram

2.1	Introduction .....	2-1
2.1.1	Difference between System Analysis and System Design.....	2-1
2.2	Class Modelling.....	2-2
2.2.1	Class Structure .....	2-2
2.3	Class Diagram .....	2-4
2.3.1	Process of Developing Class Diagrams.....	2-4
2.3.1(A)	Identifying Analysis Classes .....	2-4
2.3.2	Class Associations and Identification of Associations.....	2-7



2.3.2(A) Association.....2-7	3.2 Activity Diagram .....3-2
2.3.2(B) Identifying Association.....2-9	3.2.1 Component of Activity Diagram.....3-3
2.3.3 Simplify Classes using Relationships.....2-10	3.2.1(A) Activity and Actions .....3-3
2.3.3(A) Generalization/Specialization Relationship .....2-10	3.2.1(B) Initial and Final Activity .....3-3
2.3.3(B) Aggregate Relationships .....2-10	3.2.1(C) Activity Edge .....3-4
2.3.3(C) Composite Relationships.....2-11	3.2.1(D) Decision and Merge Points .....3-4
2.3.3(D) Other Terms Related to Class Diagram .....2-12	3.2.1(E) Forking and Joining.....3-5
2.3.4 Identifying Attributes .....2-13	3.2.1(F) Input and Output Pins .....3-5
2.3.5 Identifying Operation .....2-13	3.2.1(G) Activity Partitions.....3-6
2.3.6 Iterate and Refine Model .....2-14	3.2.1(H) Constraints on Action.....3-6
2.4 Analysis Classes .....2-24	3.2.1(I) Swimlanes.....3-6
2.4.1 Boundary Class.....2-25	3.2.1(J) Creating the Diagram.....3-7
2.4.2 Control Classes.....2-26	3.3 Sequence Diagram .....3-13
2.4.3 Entity Classes.....2-26	3.3.1 Elements of Sequence Diagram .....3-13
2.5 Inheritance and Polymorphism.....2-27	3.3.1(A) Objects and Roles.....3-13
2.5.1 Inheritance.....2-27	3.3.1(B) Link .....3-14
2.5.1(A) Types of Inheritances .....2-27	3.3.1(C) Object Life Line .....3-14
2.5.2 Polymorphism.....2-28	3.3.1(D) Message or Stimulus.....3-14
2.5.2(A) Types of Polymorphism.....2-28	3.3.1(E) Focus of control .....3-15
2.6 Object Diagram .....2-29	3.3.1(F) End of a Lifeline .....3-15
2.7 Component Diagram .....2-31	3.3.1(G) Conditional Message.....3-16
2.7.1 Types of Components / Elements of Component Diagram .....2-31	3.3.2 Creating Sequence Diagram.....3-16
2.7.2 Interface .....2-33	3.3.3 Modeling Interactions .....3-16
2.8 Deployment Diagram.....2-33	3.4 Collaboration Diagram/ Communication Diagram .....3-20
2.8.1 Elements of a Deployment Diagram.....2-33	3.4.1 Elements of Collaboration Diagram .....3-20
2.8.2 When to use Deployment Diagram .....2-34	3.4.2 Creating Collaboration Diagram.....3-21
2.9 Package Diagram.....2-45	3.4.3 Sequence and Collaboration Diagrams .....3-22
	3.4.4 Communication Diagram .....3-23
	3.4.5 Timing Diagram.....3-24
	3.5 State Diagrams .....3-26
	3.5.1 Element of State Diagram.....3-27
	3.5.1(A) State Machine .....3-27
	3.5.1(B) Initial and Final State .....3-29
	3.5.1(C) Triggers and Ports.....3-29
	3.5.1(D) Transitions .....3-29

### UNIT III

#### Chapter 3 : Dynamic Modelling

**3-1 to 3-39**

##### Syllabus :

Interaction and Interaction overview diagram, sequence diagram, Timing diagram, Communication diagram, Advanced state machine diagram, Activity diagram.

3.1 Overview of Interaction Diagram .....3-1
--



3.5.1(E) Composite States .....	3-30
3.5.1(F) Orthogonal State .....	3-31
3.5.1(G) Submachine States .....	3-32

### UNIT IV

#### Chapter 4 : Architectural Design 4-1 to 4-31

##### Syllabus :

Introduction to Architectural design, overview of software architecture, Object oriented software architecture, Client server Architecture, Service oriented Architecture, Component based Architecture, Real time software Architecture.

4.1	Introduction.....	4-1
4.2	Overview of Software Architecture .....	4-2
4.3	Designing Client / Server Software Architectures .....	4-3
4.3.1	Client/ Service Software Architectural Structure Patterns .....	4-3
4.3.2	Architectural Communication Patterns for Client/Server Architectures.....	4-4
4.4	Designing Service Oriented Software Architectures .....	4-7
4.4.1	What is SOA ?.....	4-7
4.4.2	Design Principles for Services.....	4-8
4.4.3	Technology Support for Service-Oriented Architecture .....	4-8
4.4.4	SOAP Protocol Stack .....	4-10
4.4.5	SOA Patterns .....	4-10
4.4.6	Software Architectural Transaction Patterns ....	4-12
4.4.7	Service Coordination in Service-oriented Architecture .....	4-12
4.5	Designing Component Based Software Architectures .....	4-13
4.5.1	Principles of Component–Based Design.....	4-13
4.5.2	Advantages of Component-Based Architecture .....	4-14
4.5.3	Modelling Components with UML.....	4-14
4.5.4	Group Message Communication Patterns .....	4-15

4.6	Designing Real-Time Software Architectures ..	4-15
4.6.1	Real Time System Characteristics .....	4-16
4.6.2	Tasks in Real Time systems .....	4-17
4.6.3	Design Pattern for Real-Time Software Architectures .....	4-18
4.6.4	Control Patterns for Real-Time Software Architectures .....	4-18
4.7	Object-Oriented Architecture.....	4-19
4.7.1	Object Oriented Analysis.....	4-20
4.7.2	Object-Oriented Design.....	4-22
4.7.3	From Static Models to Relational Database Design .....	4-24
4.7.3(A)	Object Relational Systems .....	4-24
4.7.3(B)	Table Class Mapping .....	4-26
4.7.3(C)	Object Relation Mapping.....	4-26
4.7.3(D)	Table – Inherited Classes Mapping.....	4-28
4.7.4	Object-Oriented Software Life Cycle for Software Product Lines .....	4-29

### UNIT V

#### Chapter 5 : Design Patterns 5-1 to 5-22

##### Syllabus :

Introduction to Creational design pattern – singleton, Factory, Structural design pattern- Proxy design pattern, Adapter design pattern, Behavioral – Iterator design pattern, Observer design pattern.

5.1	Introduction to Patterns.....	5-1
5.1.1	What is Design Pattern ? .....	5-1
5.1.2	Why to use Design Pattern ? .....	5-1
5.1.3	Classification of Design Patterns .....	5-2
5.1.4	Design Pattern Template/ Documenting Design Pattern .....	5-5
5.2	Creational Design Pattern .....	5-6
5.2.1	Singleton Pattern .....	5-6
5.2.2	Factory Pattern.....	5-7
5.3	Structural Design Patterns .....	5-10



5.3.1	Adapter Pattern .....	5-11
5.3.2	Proxy Pattern.....	5-14
5.4	Behavioral Design Patterns.....	5-18
5.4.1	Observer Pattern .....	5-18
5.4.2	Iterator Pattern .....	5-20

### UNIT VI

#### Chapter 6 : Testing

6-1 to 6-33

##### Syllabus :

Introduction to testing, Error, Faults, Failures, verification and validation, Whit Box Testing, Black Box Testing, Unit testing, Integration testing, GUI testing, User acceptance Validation testing, integration testing, scenario testing, performance testing. Test cases and test plan. Case studies expected for developing usability test plans and test cases.

6.1	Introduction to Testing.....	6-1
6.1.1	Testing Process.....	6-2
6.1.2	Principles of Software Testing.....	6-2
6.2	Testing Concepts: Error, Faults and Failures.....	6-3
6.3	Verification and Validation.....	6-4
6.4	White-Box Testing.....	6-5
6.4.1	Introduction .....	6-5
6.4.2	Basis Path Testing .....	6-6

6.4.3	Control Structure Testing .....	6-7
6.4.4	Static Testing .....	6-9
6.5	Black-Box Testing .....	6-10
6.5.1	Equivalence Partitioning .....	6-11
6.5.2	Boundary Value Analysis .....	6-11
6.5.3	Graph-Based Testing .....	6-12
6.5.4	Difference between White Box Testing and Black Box Testing .....	6-13
6.6	Testing Strategies .....	6-14
6.6.1	Unit Testing.....	6-14
6.6.2	Integration Testing .....	6-15
6.6.3	Drivers and Stubs.....	6-16
6.6.4	System Testing .....	6-17
6.6.5	GUI Testing.....	6-18
6.6.6	User Acceptance Testing.....	6-19
6.6.7	Scenario Testing .....	6-21
6.6.8	Performance Testing.....	6-21
6.7	Test Cases .....	6-23
6.8	Test Plan.....	6-24
6.8.1	Test Plan Structure .....	6-25
6.9	Case Studies Expected for Developing Usability Test Plans and Test Cases .....	6-28
	➤ <b>Case Studies .....</b>	<b>C-1 to C-68</b>