



## Unit - I

### Chapter 1 : Foundations of Object Oriented Programming 1-1 to 1-74

1.1	Computer .....	1-1
1.2	Binary Number System.....	1-1
1.3	Software Evolution.....	1-4
1.3.1	History of C / C++ Programming Languages .....	1-4
1.3.2	Comparison of C++ and Java .....	1-5
1.3.3	Java Evolution: History .....	1-6
1.4	Introduction to Procedural, Modular, Object-Oriented and Generic Programming Techniques .....	1-6
1.4.1	Introduction Object Oriented Programming (OOP) and OOP Languages.....	1-7
1.4.2	Limitations of Procedural Oriented Programming (POP) and Need of Object Oriented Programming (OOP).....	1-7
1.4.3	Applications of Object Oriented Programming Language .....	1-8
1.5	Fundamentals of Object-Oriented Programming : Objects, Classes, Data Members, Methods.....	1-8
1.6	Static and Dynamic Binding, Message Passing.....	1-9
1.7	Java Virtual Machine (JVM).....	1-9
1.8	Formatted and Unformatted IO Functions of C++.....	1-11
1.8.1	Formatted IO Functions.....	1-11
1.8.2	Unformatted IO Functions .....	1-12
1.9	Basic C++ Program Examples.....	1-12
1.9.1	Type Casting .....	1-14
1.10	Input / Output in Java .....	1-15
1.10.1	Displaying Output in Java .....	1-15
1.10.2	Accepting Input in Java .....	1-15
1.10.3	Accepting Input using BufferedReader Class .....	1-16
1.11	First Program of Java .....	1-17
1.12	Installing and Implementing Java .....	1-22
1.12.1	Java Development Kit (JDK).....	1-23

1.13	Solved Programs.....	1-23
1.14	Revisiting Loops Statements .....	1-27
1.14.1	Programs Based on for Loop.....	1-28
1.14.2	Nested for Loop.....	1-35
1.15	Revisiting Control Statements .....	1-43
1.15.1	Programs using if-else Statement .....	1-44
1.15.2	if-else Ladder or if-else if .....	1-46
1.16	Revisiting Arrays .....	1-47
1.16.1	Multi-dimensional Arrays .....	1-57
1.16.2	Arraycopy().....	1-64
1.17	Revisiting Strings.....	1-65
1.17.1	Methods of String Class .....	1-66
1.17.2	Methods in String Buffer Class .....	1-72

## Unit - II

### Chapter 2 : Classes, Objects and Methods

**2-1 to 2-39**

2.1	Comparison of Procedure Oriented Programming and Object Oriented Programming .....	2-1
2.1.1	Class and Object : Introduction .....	2-2
2.1.2	Introduction to Objects .....	2-3
2.1.2(A)	State and Behaviour of an Object .....	2-3
2.2	Visibility / Access Modifiers .....	2-4
2.2.1	Access Specifiers in C++ .....	2-4
2.2.2	Introduction to Java Access Modifiers .....	2-4
2.3	Encapsulation.....	2-5
2.4	Creating a Class and Adding Methods to a Class.....	2-5
2.4.1	Defining Member Functions of a Class .....	2-5
2.4.2	Internally Defined Functions .....	2-5
2.4.2(A)	Nesting of Member Function .....	2-8
2.4.3	Externally Defined Functions .....	2-8
2.4.4	Inline Member Functions .....	2-10
2.4.5	Java Member Methods .....	2-11



2.5	Object Creation and Memory Allocation: 'new' Operator .....	2-15
2.5.1	Creating Objects and Memory Allocation of Objects.....	2-15
2.5.2	Memory Recover: 'delete' Operator .....	2-15
2.6	Returning a Value.....	2-16
2.7	Adding a Method that Takes Parameters .....	2-17
2.8	The "this" Keyword .....	2-18
2.8.1	"this" Keyword in C++ .....	2-18
2.8.2	The "this" Keyword in Java .....	2-19
2.9	Method Overloading .....	2-20
2.9.1	Function Overloading or Function Polymorphism .....	2-20
2.9.2	Constructor Overloading.....	2-22
2.10	Using Object as Parameter and Returning an Object.....	2-24
2.10.1	Objects as Function Parameter/Arguments .....	2-24
2.10.2	Passing Objects to a Method.....	2-24
2.10.3	Returning Objects from a Method .....	2-26
2.10.4	Call by Value and Call by Reference .....	2-27
2.10.4(A)	Call by Value .....	2-27
2.10.4(B)	Call by Reference.....	2-28
2.11	Array of Objects in C++ .....	2-28
2.11.2	Array of Objects in Java .....	2-31
2.13	Static Data Members and Methods.....	2-37
2.13.2	Static Class Members in Java .....	2-38
2.14	Forward Declaration .....	2-39
2.15	Class as "Abstract Data Type" (ADT) .....	2-39
	• Model Question Paper (In Sem.).....	Q-1

### Unit - III

#### Chapter 3 : Constructors and Destructors

3-1 to 3-20

3.1	Introduction of Constructors : Use and Characteristics .....	3-1
3.1.1	Constructor.....	3-1

3.1.2	Constructors, Destructors, Modifiers, Iterators and Selectors .....	3-1
3.2	Types of Constructor .....	3-2
3.2.1	Default Constructor .....	3-2
3.2.2	Parameterized Constructor.....	3-3
3.2.3	Copy Constructor (Multiple Constructors/Constructor Overloading).....	3-4
3.2.4	Constructors.....	3-7
3.2.4(A)	Parameterized Constructor.....	3-7
3.2.4(B)	Default Constructor .....	3-9
3.2.4(C)	Copy Constructor .....	3-10
3.3	Constructor Overloading.....	3-12
3.4	Constructor with Default Arguments .....	3-13
3.5	Symbolic Constants.....	3-14
3.6	Garbage Collection : Destructors and Finalizers.....	3-15
3.6.1	Destructor.....	3-15
3.6.2	finalize() Method.....	3-16
3.7	A Book Shop Inventory.....	3-17

### Unit - IV

#### Chapter 4 : Inheritance and Polymorphism

4-1 to 4-54

4.1	Inheritance : Introduction and Need.....	4-1
4.1.1	Inheritance .....	4-1
4.1.1(A)	Visibility Modes and Effects.....	4-1
4.1.2	Introduction to Inheritance .....	4-2
4.1.3	Cost of Inheritance .....	4-3
4.2	Types of Inheritance or Mechanism of Software Reuse in C++ .....	4-3
4.2.1	Single Inheritance.....	4-3
4.2.1(A)	Constructors in Derived Class .....	4-7
4.2.2	Multi Level Inheritance.....	4-7
4.2.3	Multiple Inheritance .....	4-12



4.2.4	Hybrid Inheritance .....	4-13
4.2.5	Problem in Multiple and Hybrid Inheritance .....	4-15
4.2.6	Hierarchical Inheritance.....	4-16
4.3	Types of Inheritance or Mechanism of Software Reuse in Java.....	4-19
4.3.1	Single Inheritance.....	4-19
4.3.2	Multi Level Inheritance.....	4-21
4.3.3	Hierarchical Inheritance .....	4-23
4.4	Method Overriding .....	4-27
4.5	Abstract Classes and Interfaces .....	4-28
4.5.1	Abstract Classes .....	4-28
4.5.2	Interface .....	4-31
4.5.2(A)	Extending an Interface.....	4-31
4.5.2(B)	Variables in Interface.....	4-31
4.5.2(C)	Difference between Interface and Abstract Class .....	4-32
4.6	Polymorphism .....	4-36
4.6.1	Polymorphism in C++ .....	4-37
4.7	Types of Polymorphism: Compile Time and Run Time Polymorphism .....	4-37
4.7.1	Dynamic Binding using Virtual Function or Compile/Run Time Polymorphism.....	4-37
4.7.2	Rules for Virtual Functions .....	4-38
4.7.3	Pointer to Derived Class.....	4-39
4.7.4	Virtual Base Class and Abstract Class .....	4-42
4.7.5	Static Polymorphism in Java .....	4-43
4.7.5(A)	Constructor Overloading.....	4-43
4.7.5(B)	Method Overloading .....	4-44
4.7.5(C)	Operator Overloading .....	4-46
4.7.6	Dynamic Polymorphism in Java.....	4-50
4.7.6(A)	Dynamic Method Dispatch.....	4-50
4.8	Efficiency and Polymorphism .....	4-51
4.9	Case Study : A Bank Account System.....	4-51

**Unit - V**

---

<b>Chapter 5 : Exception Handling and Generic Programming</b>	<b>5-1 to 5-21</b>
---	--------------------

---

5.1	Errors and Exception-handling Fundamentals .....	5-1
5.2	Types of Errors or Exceptions .....	5-1
5.2.1	Checked Exceptions.....	5-1
5.2.2	Unchecked or Uncaught Exceptions.....	5-2
5.3	Using try and Catch .....	5-4
5.4	Multiple Catch Clauses.....	5-6
5.5	Nested try Statements.....	5-7
5.5.1	Keyword “throws”.....	5-9
5.6	User Define Exception using Throw.....	5-9
5.7	Exception Handling in C++ .....	5-11
5.8	Exception Handling Mechanism .....	5-11
5.8.1	Try-catch-throw, Multiple Catch and Catch All .....	5-11
5.8.2	Implementing User Defined Exception.....	5-12
5.8.3	Concept of Throw and Catch with Example .....	5-12
5.9	What are Generics? .....	5-13
5.9.1	Function Templates and Examples .....	5-13
5.9.2	Overloading a Template Function Using a Non-template Function .....	5-17
5.9.3	Overloading a Template Function Using a Template Function .....	5-17
5.9.4	Generic Classes, Class Template and Examples .....	5-18
5.9.5	Overview and Use of Standard Template Library (STL).....	5-18
5.10	Introduction to Language Specific Collection Interface : List Interface and Set Interface.....	5-19
5.10.1	List Interface.....	5-19
5.10.2	Set Interface.....	5-19
5.11	Collection Classes : ArrayList Class and LinkedList Class .....	5-19
5.11.1	ArrayList Class .....	5-19



5.11.2	LinkedList Class .....	5-20
5.12	Exception Handling and Generic Programming using Array List (ArrayList Class) .....	5-20

## Unit - VI

### Chapter 6 : File Handling and Design Patterns

**6-1 to 6-15**

6.1	File Handling : Introduction .....	6-1
6.2	Concepts of Stream .....	6-1
6.3	Stream Classes : Byte, Character .....	6-1
6.3.1	File Stream Classes .....	6-2
6.3.2	Advantages of Stream Classes .....	6-2
6.4	Other Useful I/O Classes .....	6-2
6.5	Input/Output Exceptions .....	6-3
6.6	Creation of Files and using the File Class .....	6-3
6.7	Using streams for reading from and writing to the files.....	6-5
6.7.1	Reading/Writing Bytes and Detecting End of File .....	6-6
6.8	Handling Primitive Data Types and Random Access Files .....	6-8
6.9	Concatenating and Buffering Files.....	6-9
6.10	Design Patterns : Introduction .....	6-11
6.11	Types of Design Patterns : Adaptor, Singleton and Iterator .....	6-11
6.11.1	Adaptor .....	6-11
6.11.2	Singleton .....	6-12
6.11.3	Iterator.....	6-12
6.12	Student Management System .....	6-12
	• Model Question Paper (End Sem.).....	Q-1 to Q-2

□□□