

GUJARAT TECHNOLOGICAL UNIVERSITY

MASTER OF COMPUTER APPLICATION

SEMESTER: III

Subject Name: **Fundamentals of Java Programming (Java)**

Subject Code: **630002**

Objectives:

- To develop proficiency in creating console based and GUI based applications using the Java Programming Language.
- To be able to understand the concepts of Object Oriented Programming Language and easily use Java.
- To get a good understanding of developing multi-threaded applications using the Java Programming Language.
- To be able to develop Applets for embedding in a web page.

Prerequisites:

Knowledge of the C programming language.

Contents:

Unit-1: Object Oriented Programming And Introduction To Java, Data Types, Operators, Statements And Defining Classes In Java

- Features of the Java Language, Object-oriented Programming
- Creating an Application in Java, Compiling and executing Applications in Java
- Program comments
- Primitive data types, Integer Data Types, Floating Point Data Types
- Reference Data types
- Arrays, single and multi-dimensional arrays
- Other reference types, classes, interfaces, enums and annotations
- Unicode escapes in Java source code
- Understanding super types and subtypes.
- Operators - Arithmetic, String concatenation, Relational, Logical, Bitwise, increment-decrement, conditional, assignment, cast and instance of operators.
- Understanding the narrowing and widening conversions of numeric data types.
- Statements - if, if-else, switch-case, for, while, do-while, break, continue and return statements.
- Various members within a class
- instance variables
- methods and their overloading
- constructors and their overloading
- Garbage collector and finalize method
- static variables and methods
- initializer blocks and the class initializer blocks

Unit -2: Inheritance and sub classing in Java and packages and use of access specifiers

- Defining subclasses
- Using super to use constructor of a super-class, Method overriding and use of super, Variable shadowing and use of super.
- Method and variable binding
- Using final with variables, methods and classes
- Abstract classes and interfaces, Abstract classes and abstract methods
- Single inheritance of classes, Interfaces
- Object class as the super class of all classes, Methods inherited from the Object class
- Uses of package and import statements, use of static imports
- use of CLASSPATH for class loading
- Access specifiers, Access specifiers for members of a package, Access specifiers for members of a class, Access specifiers for overriding methods
- Using the Java APIs
- Commonly used classes from the java. language package
- Comparable and Comparator interfaces
- String, String Buffer and the String Builder classes
- Understanding pass by value and pass by reference for Java
- Wrapper classes
- Math class constants and methods

Unit-3: Exceptions, Nested enum types and Collection framework

- Runtime stack and execution of application
- The return and the throw statements, The return type and throws declaration in methods, Checked and the Unchecked exception classes, The Throwable class
- Exception chaining, Handling exceptions with try and catch, Use of the finally block, Creating custom exception classes
- Member Types
- Top level nested classes and Inner classes, The local class and anonymous classes
- The enum type
- classes from java.util package
- Date, Time Zone, Calendar and the Gregorian Calendar classes
- Collection Framework, Collection interface, Set and List interfaces, Map interface
- Generics in the Collection Framework
- Regular Expressions, Pattern and Matcher classes
- Scanner class
- Varargs and the Formatter class

Unit-4: Stream based I/O and Multi-threading

- Stream classes, Output Stream and the Writer classes, Input Stream and the Reader classes, Bridge classes Output Stream Writer and the Input Stream Reader , Writing and reading from files using File Output Stream and the File Input Stream
- Piped Streams, Array based streams, Filter streams, Buffered streams, Print Stream and the Print Writer classes, Data and Object streams
- Random Access File
- Multi-threading, Thread class and thread of execution, Creating a new Thread of execution, Thread Group, properties of Thread instance, Daemon Threads
- Thread states, synchronization
- Another way of creating a thread of execution

Unit-5: GUI Programming, Building Applets and Introduction to Annotations

- Comparing AWT and swing features, AWT Components, Overview of the AWT components, Component properties
- Graphics context
- Containers, Container class, Layout Managers, Top-level containers
- Window class, Decorated windows Frame and Dialog
- Panel class
- Events, Event Delegation Model, AWT Events
- Adapter classes
- Swing and MVC
- J component
- J option Pane
- Showing Message, Confirm and Input Dialogs
- Browser as a container for Applets
- Life-cycle of an Applet, Applet Stub and Applet tag, Applet Context and the URL class., Applet class
- Defining a new annotation , Annotating a programming element, Annotation element names and usage, Meta-annotations

Notes:

Term work is to be carried out as per the above syllabus.

Main Reference Book(s):

- 1) Pravin Jain, “The class of Java” Pearson Education, (2010).
- 2) Cay S. Horstmann, Gary Cornell, “Core Java 2, Volume 1 – Fundamentals”, Pearson Education (8th edition – 2008).

Suggested Additional Reading:

- 1) Ivor Horton's “Beginning Java 2” JDK 5 Edition, Wiley Computer Publishing, (2007).
- 2) Ken Arnold, James Gosling, David Holmes, “The Java Programming Language”, Addison-Wesley Pearson Education (4th Edition – 2005).
- 3) Raj Kumar Buyya, S. Thamarai Selvi, & Xing Chen Chu, “Object-Oriented Programming with Java: Essentials & Applications”, Tata McGraw Hill
- 4) Cay Horstmann, “Big Java”, Wiley Computer Publishing (2nd edition – 2006).
- 5) Sharan Zakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoeber “The Java Tutorial”, Addison-Wesley Pearson Education(4th Edition), available for online reference at <http://java.sun.com/docs/books/tutorial/index.html>
- 6) James Gosling, Bill Joy, Guy Steele, Gilad Bracha, “The Java Language Specifications”, Addison-Wesley Pearson Education(3rd edition), available for download at <http://java.sun.com/docs/books/jls/download/langspec-3.0.pdf>

Chapter wise Coverage from Main Reference Book(s):

1.	Book #1 ->	Ch. 1, Ch. 2 Except for section on Various tools in JDK and Using java doc, Ch. 3, Ch. 4, Ch. 5
2.	Book #1 ->	Ch. 6, Ch. 7, Ch. 8, Ch. 9 Except for sections on generating java doc, commonly used packages from Java APIs, Ch. 10 Except for sections on Unicode characters and using supplementary characters and Numeric values requiring more than 64 bits.
3.	Book #1 ->	Ch. 11 Except for section on assertions, Ch. 12, Ch. 13 Except for sections on Arrays class, Collections class and StringTokenizer class
4.	Book #1 ->	Ch. 14 Except for sections on Pushback streams and Sequence Input Stream, Ch. 16
5.	Book #1 ->	Ch. 17 Except for section on Toolkit, Ch. 18 Except for section on Scroll Pane class, Ch. 19, Ch. 20 Except for sections on JLayeredPane class and MVC and using the models in JTable and JTree., Ch. 21, Ch. 23

Accomplishments of the Student after Completing the Course:

- Ability to create appropriate classes using the Java Programming Language to solve a problem using Object Oriented Approach.
- Ability to write console based and GUI based applications in the Java Programming Language.
- Ability to develop multi-threaded applications using the Java Programming Language
- Ability to create Applets using the Java Programming Language