

**Object Oriented Programming with Java 8****PG-DBDA September 2021****Duration:** 46 class room hours + 44 Lab hours**Objective:** To reinforce knowledge of Java Programming**Prerequisites:** Knowledge of Linux command, OOPS concepts and any programming language

**Evaluation method:**

Theory exam	– 40% weightage
Lab exam	– 40% weightage
Internal exam	– 20% weightage

**List of Books / Other training material****Text Book:**

1. Java - The Complete Reference by Herbert Schildt / Tata Mcgraw Hill Education

**Reference:**

1. Java Server Programming (J2EE 1.7 Edition) Black Book by Dreamtech Software Team
2. Java 8 Programming Black Book by Dreamtech Press
3. Core Java : Fundamentals - Volume 1 Gary Cornell, Cay S. Horstmann/ Pearson
4. Programming in Java by Sachin Malhotra, Saurabh Choudhary / Oxford University Press
5. Core Java : Advanced Features - Volume 2 Gary Cornell, Cay S. Horstmann/ Pearson
6. Beginning Java 2 by Ivor Horton; Wrox Publication
7. The Complete Reference Java Eight Edition, Herbert Schildt/ TMH
8. Object-Oriented Analysis and Design with applications by Booch
9. Core Java 8 for Beginners by Sharanam Shah, Vaishali Shah / Shroff Publishers & Distributors
10. Murach's Java Programming 4th edition by Joel Murach / Shroff Publishers & Distributors
11. Advanced Java programming by Uttam K Roy / Oxford University press
12. Sun Certified Enterprise Architect For Java EE Study Guide by Cade, 2nd Edition (Paperback)
13. Programming in Java by Sachin Malhotra, Saurabh Choudhary / Oxford University Press
14. Professional Java EE Design Patterns by Murat Yener, Alex Theedom, Reza Rahman

**Note:** Each session having 2 Hours**Session 1, 2 and 3:****Lecture**

- Java 8 Basics : Overview of Java, Features of Java, Scope of variables
- Object Oriented Concepts
- JDK and its usage (Java Compiler, Java Runtime, Java Debugger, Java doc)
- Working with Data Types: Structure of a Java Class, Importing Packages, Difference between object reference variables and primitive variables, how to read or write to object fields)

**Session 4:****Lecture**

- Object's lifecycle (creation, reassignment, garbage collection: new, finalize)
- Wrapper classes (Boolean, Double and Integer)

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- **Operators** (Unary, Binary, Arithmetic, Assignment, Compound, Relational, Logical, Equality) and **Control Statements** (if, if-else, for, while, switch, do-while, break and continue, ternary constructs)

**Session 5:****Lecture**

- **Packages and classpath**
- Arrays
- Understanding of String Class, StringBuilder Class, StringBuffer class
- Methods and Encapsulation: Methods, Access Modifiers, Method Overloading, Passing Data, Creating Constructors, Immutable Classes

Assignment – Lab:

Get yourself acquainted with java environment. Build a class Emp, which contains details about the employee and compile and run its instance

**Assignment – Reading:**

Study the book Java FAQ

**Assignment – Tutorial:**

Compare syntactical similarities and dissimilarities between Java and C++

**Session 6:****Lecture**

- Class Inheritance, Abstract Classes, Inner Classes, Interface and Implementation classes.
- Understanding Polymorphism: Object vs Reference, Object Casting, Virtual Methods, Method Overriding

Assignment – Lab:

**Create an inner class for a manager, which contains information about the manager. Use the appropriate interfaces. Create an anonymous inner class for Tech. Members using the Session one assignment**

**Session 7 & 8:****Lecture**

- Exception-Handling: Basics, Role of Exceptions, Types
- Using try and catch, Multiple Catch, Nested try (throw, throws, finally)
- Built-in Exceptions, Runtime Exceptions Checked Exceptions, Errors
- Creating own Exception Subclasses

Assignment – Lab:

Create a user defined exception to check whether your employee exist in your data structure and using the catch and finally block. Redeem an appropriate solution.

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**Session 9:****Lecture**

- Enumerations, Auto boxing, and Annotations
- Lambda Expressions
- Java 8 New Features

**Session 10 & 11:****Lecture**

- Java API: java.util, java.lang, java.math

**Assignment – Lab:**

Create an appropriate data structures to store your employee object and use the java.util.package properties.

**Session 12 & 13:****Lecture**

- Generics and Collections
- TCP and IP
- Communication with TCP/IP Protocol

**Assignment – Lab:**

1. Implement String class and util package
2. Using the collection framework define an appropriate interface to your above application
3. Implement to Send File Contents (two way communication Java)
4. A Simple Java TCP Server and TCP Client
5. Create a user defined exception to check whether your employee exist in your data structure and using the catch and finally block. Redeem an appropriate solution

**Session 14:****Lecture**

- Functional Programming Overview
- Functional Interfaces
- Explore java.util.function package : Predicate, Map, Consumer, Supplier
- Impact of Functional programming upon Collection Framework

**Session 15 & 16:****Lecture**

- Introduction to Streams
- Streams vs. Collections
- java.util.stream.Stream API
- Types of Primitive Streams : IntStream, LongStream, DoubleStream & its API
- Different operations on streams : filter, map, reduce, sort, flatMap, anyMatch, count, boxing.
- Overview of Java 8 Date Time API

**Object Oriented Programming with Java 8****PG-DBDA September 2021****Session 17 & 18 :****Lecture**

- Java Concurrency: Using threads in Java, Life cycle of thread
- Advantages and issues
- Thread class, thread groups
- The Runnable interface

**Session 19:****Lecture**

- Synchronization, Inter-Thread communication
- Executor Framework overview

**Assignment – Lab:**

Using Multi-Threading create concurrent java application, to write data to file in a thread safe manner.  
Apply Thread safety to Collection Framework API classes

**Session: 20 :****Lecture**

- The java.io Package
- Files
- Byte Streams and Unicode Character Streams
- Persistence of objects
- Object Serialization Methods

**Assignment – Lab:**

Make your above Employee, manger classes objects persistent.

**Session: 21****Lecture: Reflection in Java**

- Java Reflection Classes, Methods, Getter Setters, Constructors, Annotations, generics, Arrays, Dynamic method invocation

**Assignment – Lab:**

Create a new array, whose size and component types are not known until runtime, and then modify the array's components

**Session: 22****Lecture: Reflection in Java & JVM Architecture**

- Why Java Reflection
- What is it ?
- Basic Reflection API for finding out details of the class name,super classes & interfaces.
- What is a Java Virtual Machine?
- The Architecture of the Java Virtual Machine

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**Session 23:**

**Lecture**

- Introduction of JDBC API
- JDBC Architecture
- JDBC Drivers
- Drivers, Connection, Statement , PreparedStatement and Result Set interfaces and their relationship to provider implementations
- Writing JDBC Application along with DAO & POJO Layers
- Stored Procedures and functions invocation