Suggested Teaching Guidelines for

Java Technologies-I (Core Java)–PG-DAC February 2020

Duration: 36 classroom hours +34 lab hours **(70hrs)**

Objective: To introduce the student to Core Java Technologies

Prerequisites: Knowledge of object oriented programming

Evaluation method: Theory exam– 40% weightage
Lab exam – 40% weightage
Internal exam– 20% weightage

List of Books / Other training material

Text Book:

1. Core and Advanced Java Black Book Black by Dreamtech Press

Reference:

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

Session 1:
Lecture

- Java 8 Basics :Overview of Java, Features of Java, Scope of variables
- 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 2:
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 3:
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 4:
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 5:
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.

Session 6:
Lecture

- Enumerations, Auto boxing, and Annotations

- Lambda Expressions
- Java 8 New Features

Session 7 & 8:
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 9 & 10:
Lecture

- Generics and Collections

Assignment – Lab:

1. Implement String class and util package
2. Using the collection framework define an appropriate interface to your above application

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.

Session 11:
Lecture

- Java NIO (NIO 2) Overview
- NIO classes: Fundamentals, Path Interfaces, Manage metadata of a file or directory,
- Byte Buffers & Channels
- UDP, TCP and IP
- Communication with TCP/IP Protocol

Assignment – Lab:

- Implement to Send File Contents (two way communication Java)
- A Simple Java TCP Server and TCP Client

Session 12:
Lecture

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

Session 13:
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: 14 & 15
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: 16
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 type are not known until runtime, and then modify the array's components

Session: 17: Java Virtual Machine
Lecture
- What is a Java Virtual Machine?
- The Lifetime of a Java Virtual Machine
- The Architecture of the Java Virtual Machine
- Java Mail
  - javax.mail.internet Class ContentType
  - Method
  - java.lang.String, getBaseType()
  - java.lang.String, getParameter(java.lang.String name)

Assignment – Lab
- Configuring JavaMail API and sending test mails
- Implement to send multiple mails, mails with attachments, calendar appointment etc.

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Session 18:
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