LAKSHYA INSTITUTE OF TECHNOLOGY

BCA, BSc ITM and BSc CS

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UPDATED SYLLABUS OF CORE JAVA (JDK 21)

MODULE 1 - INTRODUCTION TO JDK-21

- Features of Java Language with
- practical demonstration
- What does Java lack
- Application Areas of Java in
- Industry
- Comparison in Java with C and C++
- The Java Virtual Machine (JVM)
- JDK, JRE and JIT
- Var concept, JShell and Javap
- Use of Javac and De-Compiler

MODULE 2 – LANGUAGE FUNDAMENTALS

- Program Development in different environment (Windows / Linux)
- Compilation and Executions procedure using different editor and IDE
- Access specifiers and its requirement in java
- Naming conventions and identifiers
- About public static void main ()
- Command-Line Arguments
- System. out and System. err

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MODULE 3 - WRAPPER CLASS AND

- DATATYPES
- Primitive Datatypes and NonPrimitive Datatypes
- Byte, Integer, Character, Float, Double, Boolean, Short, Long
- UNICODE system
- Type conversions
- Implicit conversion, Explicit conversion
- Wrapper class implementation

MODULE 4 - OPERATOR, VARIABLE BLOCK AND METHOD IN JAVA

- Arithmetic, Relational, Logical, Shift, Assignment, Unary, Bitwise, Special, Ternary, Instanceof operators
- Static, Instance, Local, final, transient, volatile variable
- Static and Non-static block and method
- Native Application in Windows & Linux
- Abstraction (Abstract Method and Abstract Class) and Anonymous class
- Uses of final keyword

MODULE 5 - CONSTRUCTOR WITH JAVA

- Constructor requirement and its types
- Copy and private constructor
- Reference and object
- Size of object
- Constructor overloading
- Factory method and singleton class

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MODULE 6 – RUNTIME INPUT MECHANISM

- Command-Line Arguments
- Scanner class
- BufferedReader class
- DataInputStream class
- Console class

MODULE 7 – CONTROL STRUCTURE USING JAVA

- Conditional control structure vs Conditional operator
- If, if…Else, Nested and Multiple If
- Loop control structure using for, while, do…while and for-each loop.
- Selection control Structure using switch. Case.
- Jump control structure using break, break with label, continue and return in java

MODULE 8 - POLYMORPHISM

- Polymorphism in OOP
- Overloading and Overriding
- Method and Constructor Overloading
- Constructor chaining
- Uses of "this" keyword
- Method overriding and its restrictions
- Use of "super" keyword
- Dynamic method dispatching by down-casting and up-casting

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MODULE 9 – RELATIONSHIP

- Association (HAS-A) relation
- Aggregation vs Composition
- Benefits of Inheritance (IS-A) over aggregation in OOP
- Loose and tight coupling
- Coupling vs Cohesion
- Role of Constructors in inheritance
- Single, Multiple, Multi-Level, Hierarchical, Hybrid Inheritance
- Implementing interfaces.
- Abstract Class vs Interfaces
- Static, default, private methods of Interface

MODULE 10 - PACKAGE

- Organizing Classes and Interfaces in Packages.
- Package as Access Protection
- Defining Package and SubPackage
- Advantage of package
- CLASSPATH Setting for Packages
  Making JAR Files for Library Packages
- Import and Static Import
  Creating doc files
- Creating .EXE and jar executable file
  Setup file

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MODULE 11 - ARRAY

- Defining an Array
- Problem solving using single dimensional Array
- Arrays class and its methods
- Multi Dimensional Array and its implementation
- Importance of Jagged Array
- Array of Objects
- Object comparisons using Comparator and comparable interface

MODULE 12 - STRING, STRINGBUFFER AND STRINGBUILDER

- String – what and why
- Operation on String
- Text-Block in String
- String comparison and concatenation
- Method of String class
- Mutable and Immutable object
- StringBuffer class and its methods
- StringBuilder class and its methods
- Creating Immutable class like String

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MODULE 13 - DATA STRUCTURE USING JAVA

- Collection Framework
- LinkedList implementation
- Store objects in ArrayList & Vector
- Data structure implementation using Stack, Queue & Deque
- Use of HashSet & TreeSet
- Map Collection
- Understanding Hashing
- Use of HashMap, TreeMap & Hashtable
- Enumeration interface
- Iterator vs ListIterator interface
- Collection traversing using different techniques

MODULE 14 - EXCEPTION HANDLING

- Why Exception?
- Exceptions & Errors
- Checked and Un-Checked Exceptions
- Control Flow in Exceptions
- Use of try and catch block
- Multiple catch block
- Nested try and finally block
- How to handle unreachable statements using finally.
- throw and throws keyword
- Exception Propagation
- Exception Handling with Method Overriding
- In-built and User Defined Exceptions

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MODULE 15 - FILE HANDLING

- Java.io package
- File class of java.io package and its methods
- Different ways to read and write operation with File.
- FileOutputStream & FileInputStream
- FileWriter & FileReade
- BufferedReader and BufferedWriter class
- Compressing and Uncompressing File
- DataInputStream and DataOutputStream
- Serialization and De-Serialization
- Transient variable
- Try with resources

MODULE 16 - MULTITHREADING & MULTI-PROCESSING

- Understanding Thread and Process.
- Multithreading – what and why
- Multithreading vs Multiprocessing
- Different ways to create a Thread
- Life-Cycle of Thread
- Method implementation of Thread
- Thread Priorities
- Daemon thread
- Implementing Runnable interface
- Synchronizing Threads – what and why
- Synchronized method and block
- Locking mechanism
- Inter Thread Communication
- Producer & Consumer problem with balancing using wait () & notify ().

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MODULE 17 - NETWORKING AND SOCKET PROGRAMMING

- Process and Networking
- Client-Server Architecture.
- InetAddress class
- IPC and RPC
- Multiple Client and Single Server
- ServerSocket and Socket
- Communicate between two processes in single or different system.
- Two-way communication
- Read and write operation between client and server.
- PrintWriter and BufferedReader class for read and write operation
- DatagramSocket and DatagramPacket
- Developing chatting application for multiple System
- TCP and UDP protocol

MODULE 18 - GUI PROGRAMMING USING AWT

- Components and Containers
- Frame, Dialog, Window and Panel
- Layout Managers and user-defined layout
- BorderLayout, FlowLayout, GridLayout, GridbagLayout, BoxLayout
- Color, Font and Graphics class
- AWT Components
- Menu Application

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MODULE 19 - GUI PROGRAMMING USING SWING

- Extending GUI Features Using SWING Components
- Designing GUI using NetBeans by drag and drop
- Advanced swing components like JProgressbar, JSlider, JRadioButton, JTree, JTable, JToggleButton, etc.

MODULE 20 - GUI PROGRAMMING USING JAVAFX

- Swing vs Javafx
- Architecture, Application, 2D shapes, Text, Effects, Transformation
- Animations, Colors, Image, 3D shapes
- UI controls, Layout panes, CSS

MODULE 21 – GUI UISNG APPLET

- Applet and its use
- Design Patterns using Applet and JApplet.
- Run Applet application by browser and applet tool.
- Applet Architecture.
- Parameters and Life Cycle of Applet
- Graphics in Applet
- Displaying image and Animation in Applet
- Painting in Applet
- Applet Communication
- Digital Clock in Applet
- Analog Clock in Applet

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MODULE 22 - EVENT HANDLING

- Event-Driven Programming in Java
- Event- Handling Process withAWT
- Working with Listeners
- Event-Handling Mechanism withSWING
- Event Classes and its methods
- Adapter Classes as HelperClasses in Event Handling
- Event- Handling Process withJAVAFX
- Applet with Event-Handling

MODULE 23 - REGULAR EXPRESSIONAND LAMBDA EXPRESSION

- What is regex
- java.util.regex package
- Character set
- Quantifiers
- Meta-Characters
- Modifier flags
- Use of lambda expression and itsScope

MODULE 24 - DATABASE PROGRAMMINGUSING JDBC

- Introduction to JDBC
- Steps to connect to the database
- Types of JDBC Drivers andArchitecture
- Connectivity with Oracle andMySQL

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