**CS22409 JAVA PROGRAMMING: THEORY AND PRACTICES**

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|---|---|---|---|
| 3 | 0 | 2 | 4 |

**OBJECTIVES**

- To understand the basic concepts of object-oriented programming (OOP) and how they apply to Java.
- To be familiar with the fundamentals of Classes, Packages and Inheritance.
- To define and implement Interfaces and Exceptions in Java
- To understand and demonstrate I/O Streams and Multithreading concept.
- To design and build Graphical User Interface Application using Applet and JAVAFX

**UNIT I INTRODUCTION TO OOP AND JAVA 9+6**

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment – Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Comments, Data Types, Variables, Operators, Control Flow, Arrays - JavaDoc comments.

**Suggested Activities :**

Develop a Java program which initializes earning of an employee. The program should calculate the income tax to be paid by the employee as per the criteria given below:

| SLAB RATE | IT RATE |
|---|---|
| Upto Rs.50000 | NIL |
| Upto Rs.60000 | 10% on additional amount |
| Upto Rs.150000 | 20% on additional amount |
| Above Rs.150000 | 30% on additional amount |

**UNIT II CLASSES, PACKAGES AND INHERITANCE 9+6**

Defining classes in Java – constructors, methods -access specifiers - static members – Package creation Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes –- Object cloning -inner classes.

**Suggested Activities :**

Develop a java application with an Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary

**UNIT III INTERFACES , STRINGS AND EXCEPTION HANDLING 9+6**

Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces -Exceptions - exception hierarchy - throwing and catching exceptions – built-

in exceptions, creating own exceptions- String Manipulations.

**Suggested Activities :**

- Write a java program to define an interface advancedArithmetic which contains a method signature int divisor sum(int n). Implement it in a class mycalculator to calculate sum of divisors of a number.
- Write a java program to check if two strings are anagrams of each other
- Write a java program to create your own exception as NeagtiveValueException whenever negative values are put in an array

**UNIT IV I/O STREAMS AND MULTITHREADING 9+6**

Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files. Differences between multi-threading and multitasking, thread life cycle, creating threads, Inter-thread communication.

**Suggested Activities :**

- Write a java program to copy the contents of one file to another using file stream.
- Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number

**UNIT V JAVA APPLET AND JAVAFX 9+6**

Introduction and Advantage of Applet-How to create and run an Applet and Applet Viewer-Life, cycle of Applet-Introduction to JAVAFX - Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – Menus – Basics – Menu – Menu bars – MenuItem.

**Suggested Activities :**

Develop Student management application using JavaFX controls, layouts and menus

**TOTAL (L:45 + P:30): 75 PERIODS**

**OUTCOMES:**

| CO | CO statements<br>Upon successful completion of the course, the students should be able to | RBT level |
|---|---|---|
| CO1 | Understand the fundamentals of Java programming including variables, data types, control structures and methods. | 2 |
| CO2 | Apply the concepts of problems classes, objects, packages and inheritance to solve simple problems. | 3 |
| CO3 | Create Java applications with Interfaces, Strings and Exception Handling mechanism. | 6 |
| CO4 | Apply the concepts of streams and multithreaded model to solve real world problems | 3 |
| CO5 | Apply the concepts of Applet, JavaFX components and controls for developing GUI based applications | 3 |

1- Remember, 2- Understand, 3- Apply, 4- Analyse, 5- Evaluate, 6- Create

**TEXT BOOKS**

1. Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015

**REFERCENCES**


1. Paul Deitel, Harvey Deitel, ―Java SE 8 for programmers, 3rd Edition, Pearson, 2015.
2. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.
3. Steven Holzner, ―Java 2 Black book, Dreamtech press, 2011.


**COURSE ARTICULATION MATRIX**

| COs | POs | | | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| 1 | 1 | 1 | 3 | 1 | 3 | - | - | - | 3 | 2 | 2 | 2 | 3 | 1 |
| 2 | 2 | 1 | 3 | 2 | 1 | - | - | - | 2 | 1 | 1 | 3 | 3 | 3 |
| 3 | 3 | 3 | 1 | 2 | 2 | - | - | - | 3 | 2 | 1 | 2 | 3 | 1 |
| 4 | 3 | 1 | 2 | 2 | 2 | - | - | - | 1 | 2 | 1 | 3 | 3 | 1 |
| 5 | 1 | 1 | 2 | 3 | 2 | - | - | - | 3 | 2 | 1 | 2 | 3 | 3 |

**3-High, 2-Medium, 1-Low**