ASSIGNMENT NO:6

1) What is method overloading in Java & explain with an example.?

2) What are the rules for method overloading resolution in Java? How does Java determine which overloaded method to call?

3) What does the static keyword mean in Java? Explain the difference between static and non-static methods.

4) Can static methods be overloaded and overridden in Java?How are static variables shared across multiple instances of a class?

5) What is the role of the static keyword in the context of memory management.

6) What is the significance of the final keyword in Java?

7)Can a final method be overridden in a subclass?How does the final keyword affect variables, methods, and classes in Java?

8) What does the this keyword represent in Java?How is the this keyword used in constructors and methods?

9) What are narrowing and widening conversions in Java?

10) Provide examples of narrowing and widening conversions between primitive data types.

11) How does Java handle potential loss of precision during narrowing conversions?

12) Explain the concept of automatic widening conversion in Java.

13) What are the implications of narrowing and widening conversions on type compatibility and data loss?

Q1) What is method overloading in Java & explain with an example?

→ Method overloading is the process that can create multiple methods of the same name in the same class, and all the methods work in the different ways.

example:-
```
class Shapes {
    public void area() {
        System.out.println("Find area");
    }
    public void area(int r) {
        System.out.println("circle area=" 3.14*r*r);
    }
class main {
    public static void main(String[] args) {
        Shapes s = new Shapes();
        s.area();
        s.area(5);
    }
}
```

Q2) What are the rules for method overloading resolution in Java? How does Java determine which overloading method to call?

→ - In overloading, methods must have different parameters.
- The class should be same.
- The method should be same.
- The Parameter type or Parameter number should be different.

Java determines method overloading based on the number and types of parameters in the method signature.

Q3) What does static Keyword mean in Java? Explain the difference between static & non static methods.

→

Static Keyword in java indicates that a particular member is not an instance, but rather part of a type. The static member will be shared among all instances of the class, so we will only create one instance of it.

Static method is a class method and belongs to the class itself. This means you do not need an instance in order to use a static method. A non-static method is an instance method and belongs to each object that is generated from the class

Q4) Can static methods be overloaded and overridden in Java? How are static variables shared multiple instances of a class?

→ Static methods in Java cannot be overridden. This is because static methods are not associated with the instance of a class, but with the class itself. Therefore, when a subclass inherits a static method from its parent class, it cannot modify the behavior of the static method ~~of~~ in any way.

If the same class is loaded in different class loaders, then each copy of the class will have its own statics.

Q5.) What is the role of static keyword in the context of memory management?

→ The static keyword in Java is mainly used for memory management. The static keyword in Java is used to share the same variable or method of a given class. The users can apply static keywords in variables, methods, blocks, and nested classes. The static keyword belongs to the class than an instance of the class.

It helps in memory management as static variables are shared among all instances, reducing the amount of memory required.

Q6.) What is the significance of final keyword in Java?

→ Final is a keyword in Java.

① Final Variable:- If we make any variable as final, we cannot change the value of final variable. (it will be constant)

② Final method:- If we make method as final, we cannot override it.

③ Final class:- If we make any class a final we cannot extend it.

Q7) Can a final method be overridden in a subclass? How does the final keyword affect variables, methods, & classes in Java?

⟹ No, the Methods that are declared as final cannot be overridden or hidden.
If variables made final then we cannot change its values. If method made final then we cannot override it. If classes made final then we cannot extend it.

Q8) What does this keyword represent in Java? How is this keyword used in constructors and methods?

⟹ 'this' represents the instance of the class where it's used. It's commonly used to access or modify the fields of the current object, especially when field names are the same as local variable names.
The 'this' keyword refers to the current object in a method or constructor. The most common use of the 'this' keyword is to eliminate the confusion between class attributes and parameters with the same name.

Q9) What are narrowing & widening conversions in Java?

⟹ In Java there are Two types of casting:
① Widening :- Converting a smaller data-type to a larger datatype
eg:- byte → short → char → int → long

② Narrowing :- Converting a large / datatype to a smaller data-type.
eg:- float → long → int → char → short → byte.

10.) Provide examples of narrowing & Widening conversions between primitative data types?

⇒ Widening:-

```
public class Main {
    public static void main (String [] args){
        int a=5;
        float b=3.5f;
        float sum = a+b;
        System.out.println ("Value of a =" +a);
        System.out.println ("Value of b=" +b);
        System.out.println ("sum =" +sum);
    }
}
```

Narrowing:-

```
public class Main {
    public static void main (String[] args){
        float a = 5.7f;
        int b = (int)a;
        System.out.println ("Value of b =" + b);
    }
}
```

11.) How does Java handle potential loss of precision during narrowing conversions?

→ In the case of double to float, you can have a constant value which is in the right range, but still lose precision. In your specific case of 10.0, the value can be represented exactly in both float and double

eg:- float f = (float) 10.1;
double d = 10.1;
System.out.println(f == d);

Q12) Explain the concept of automatic widening conversion in Java.

→ Widening conversion takes place when two data types are automatically converted. This happens when: the two datatypes are compatible. When we assign a value of a smaller data type to a bigger data type.

Byte → Short → Int → Long → Float → Double

Q13) What are the implications of narrowing and widening conversions on type compatibility and data loss?

→ Widening conversions preserve the source data value but can change its representation. This occurs if you convert from an integral type to Decimal, or from Char to String. A narrowing conversion changes a value to a data type that might not be able to hold some of the possible values.