



MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT: COMPUTER SCIENCE & INFORMATION SYSTEMS

MODULE: OBJECT ORIENTED PROGRAMMING III

CODE: BSCIS423

SESSIONAL EXAMINATIONS
APRIL 2024

DURATION: 3 HOURS

EXAMINER: MR TS MUWANI

INSTRUCTIONS

- 1. Answer ANY FIVE Questions*
 - 2. Each question carries 20 marks*
 - 3. Total marks 100*
 - 4. Start a new question on a fresh page*
 - 5. Additional material(s): None*
-

Question 1

a) In the program snippet below, show the outputs in the spaces provided:

```
public class FinalExam1 {  
    public static void main(String[] args) {  
        String S1 = "Java Programming";  
        String S2 = " is taught";  
        String S3 = " at Colorado State";  
        int iSize = S3.length() + 3;  
        System.out.println(iSize);  
  
        char cChar = S1.charAt(10);  
        System.out.println(cChar);  
  
        int iIndex = S2.indexOf("p");  
        System.out.println(iIndex);  
  
        String sSubstr = S1.substring(1, 7);  
        System.out.println(sSubstr);  
  
        boolean bEquals = S2.equals(" is taught");  
        System.out.println(bEquals);  
    }  
}
```

- | | | | |
|------|-----------------------|------|-----------|
| i. | First line of output | ---- | [2 marks] |
| ii. | Second line of output | ---- | [2 marks] |
| iii. | Third line of output | ---- | [2 marks] |
| iv. | Fourth line of output | ---- | [2 marks] |
| v. | Fifth line of output | ---- | [2 marks] |

b) Give the output of the following code snippet:

```
public class FinalExam3 {  
    static double values[] = {0.0, 1.5, 3.0, 4.5, 6.0};  
    static double variable = 5.0;  
  
    public static void main(String[] args) {  
        System.out.println(tripleNumber(10));  
        System.out.println(tripleNumber(variable));  
        System.out.println(tripleNumber(values[2]));  
        System.out.println(values[2]);  
        doubleArray (values);  
        System.out.println(values[2]);  
    }  
    public static double tripleNumber(double param) {  
        return param + param + param;  
    }  
    public static void doubleArray(double array[]) {  
        for (int i = 0; i < array.length; i++)  
            array[i] *= 2.0;  
    }  
}
```

- | | | | |
|------|-----------------------|------|-----------|
| i. | First line of output | ---- | [2 marks] |
| ii. | Second line of output | ---- | [2 marks] |
| iii. | Third line of output | ---- | [2 marks] |
| iv. | Fourth line of output | ---- | [2 marks] |
| v. | Fifth line of output | ---- | [2 marks] |

Question 2

a) Show the output of the following program.

[9 marks]

```
class A
{
    String s = "Class A";
}

class B extends A
{
    String s = "Class B";

    {
        System.out.println(super.s);
    }
}

class C extends B
{
    String s = "Class C";

    {
        System.out.println(super.s);
    }
}

public class MainClass
{
    public static void main(String[] args)
    {
        C c = new C();

        System.out.println(c.s);
    }
}
```

b) Study the Java program construct below, state and correct errors if they exist.

[6 marks]

```
public class A
{
    public A()
    {
        System.out.println(1);

        super();

        System.out.println(2);
    }
}
```

- c) Using an example, explain how multiple inheritances can be achieved in Java. [5 marks]

Question 3

- a) Give the output of the program below. [9 marks]

```
class M
{
    int i = 51;
    public M(int j)
    {
        System.out.println(i);
        this.i = j * 10;
    }
}
class N extends M
{
    public N(int j)
    {
        super(j);
        System.out.println(i);
        this.i = j * 20;
    }
}

public class MainClass
{
    public static void main(String[] args)
    {
        N n = new N(26);

        System.out.println(n.i);
    }
}
```

- b) Explain the effects of using both super class and sub class have a field with same name. [2 marks]
- c) Explain exception handling mechanism in Java. [9 marks]

Question 4

With the aid of Java programs, discuss the two types of polymorphism in Java.

[20 marks]

Question 5

- a) The below program throws *ArithmeticException*. Study it carefully and shows how *ArithmeticException* can be handled using try-catch blocks. [6 marks]

```
public class ExceptionHandling
{
    public static void main(String[] args)
    {
        System.out.println("This statement will be executed");

        int i = 1000/0; //This statement throws ArithmeticException : / by zero

        System.out.println("This statement will not be executed");
    }
}
```

- b) Using a valid Java program, explain abstraction [14 marks]

Question 6

- a) Identify the error in the following code [3 marks]

```
class A
{
    class B
    {
        static void methodB()
        {
            System.out.println("Method B");
        }
    }
}
```

b) Demonstrate how to access field 'i' of class 'XYZ.'

[3 marks]

```
class ABC
{
    class XYZ
    {
        int i = 111;
    }
}
```

c) Demonstrate why is the following code displaying a compile time error?

[4 marks]

```
interface X
{
    void methodX();
}

class Y implements X
{
    void methodX()
    {
        System.out.println("Method X");
    }
}
```

d) Create a Java program to determine whether or not a given number is an Armstrong number. An Armstrong number is one that is equal to the sum of its digits each raised to the power of the number of digits in it. As an example: Armstrong's numbers include 153, 9474, and 54748. [10 marks]

$$153 = 1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$$

$$474 = 9^4 + 4^4 + 7^4 + 4^4 = 6561 + 256 + 2401 + 256 = 9474$$

$$54748 = 5^5 + 4^5 + 7^5 + 4^5 + 8^5 = 3125 + 1024 + 16807 + 1024 + 32768 = 54748$$

END OF EXAMINATION!