**UNITY UNIVERSITY**

**DEPARTMENT OF COMPUTER SCIENCE**

**NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_IDNO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***Part One: Read the questions 1 to 5 carefully and give short and precise answer for each questions in the boxes provided under each questions (20 marks).***

1. When an overridden method is called from within the sub-class? Explain the two events observed both in the super class and subclass of overridden method (2 marks)
2. Write the difference between Overloading and Overriding methods (4 marks)

|  |  |
| --- | --- |
| **Overloading Method** | **Overriding Method** |
|  |  |

1. Write down the syntax or general form to define a subclass, abstract class and to declare objects (3 marks).
2. **Syntax to define Subclass**
3. **Syntax to declare Objects**
4. Discuss the three object oriented programming paradigms (Encapsulation, Inheritance and Polymorphism) in details and show how each of them are implemented by giving examples. (7 marks).
5. Encapsulation
6. Inheritance
7. Polymorphism
8. Explain the difference between **this** keyword and **super** keyword and write the syntax for super when super is used to call superclass constructor and access instance members of the superclass (4 marks)

|  |  |
| --- | --- |
| **this keyword** | **Super keyword** |
|  | 1. Syntax to call super class constructor 2. Syntax to access superclass members |

***Part Two: - Read the java code that is described in each of the following questions (6- 7) carefully and identify the syntax errors you observed and write your answers inside the box provided under each questions (10 marks)***

1. Observe the following simple java program and identify the syntax errors and write only the correct code to make the program error free (4 marks)

class A{

protected int i;

}

class B{

protected int j; //variables of B class

public B(){

j=0;

}

//Initialize the super class members i using super()

public B(int i, int j){

super(i); //calling the constructor of the super class

this.j = j;

}

public void M2(){

System.out.println("This is from B");

}

}

class C{

protected int k;

public C(){

k = 0;

}

//Initialize the super class (B)members i and j using Super()

public C(int i, int j, int k){

super(i, j); //Calling the constructor of Class B

**Syntax Errors**

this.k = k;

}

public void M3(){

System.out.println("This is from C");

}

}

class TestOfInheritance{

public static void main(String args[]){

C o = new C(3, 5, 9);

o.M1();

System.out.println(" i = " + o.i);

}

}

1. Identify the syntax errors you observed for the following java program and write your answer inside the box provided below (10 marks).

**Syntax Errors**

class C1{

protected int y;

public C1(float x, int y){

this.x = x \* x;

this.y = y;

}

}

class C2 extends C1{

public C2(float x, int y, float z){

super(x,y);

this.x =x;

this.z = z;

}

public void M1(){

z = (super.x + y)/x;

System.out.println("Superclasses version of x: " +super.x);

System.out.println("Subclasses version of x: "+x);

System.out.println(" Z = " +z);

}

}

class HideSuperClassField{

public static void main(String args[]){

C2 o = new C2(2, 4, 6);

o.M1();

System.out.println("Y = " +o.y);

} }

***Part Three:- Read the java code that is described in each of the following questions (8-9) carefully and determine the output of the program you expect and write your answers inside the box provided under each questions (10 marks)***

1. What is the output of the following java program? Write the output inside the box below (5 marks).

class King {

**Output**

void check() {

System.out.println("No parameters");

}

// =================================

void check(int a) {

System.out.println("a: " + a);

}

// =================================

void check(int a, int b) {

System.out.println("a and b: " + a + " " + b);

}

// =================================

double check(double a) {

System.out.println("double a: " + a);

return a\*a;

}

}

class TestKing {

public static void main(String args[]) {

King ob = new King();

double result;

// ===================================

ob.check();

ob.check(10);

ob.check(10, 20);

result = ob.check(12.2);

System.out.println("Result of ob.test(12=.2): " + result);

}

}class NotOverriding {

public static void main(String args[]) {

B subOb = new B(1, 2, 3);

subOb.show("This is k: "); // this calls show() in B

subOb.show(); // this calls show() in A

}

}

1. Determine the output of the following simple java program and indicate the implementation of this program (5 marks).

class A{

protected int i;

public A(int i){

this.i = i;

}

public void Increment(A parent){

parent.i++;

System.out.println("Incremented I of A = "+parent.i);

}

}

class B extends A{

public B(int i){

super(i);

}

public void Decrement(B child){

child.i--;

System.out.println("Decremented I of B = "+child.i);

}

}

**Output**

class Test{

public static void main (String args[]){

B b1, b2;

A a1;

b1 = new B(30);

b2 = new B(52);

a1 = new A(180);

a1.Increment(a1);

a1.Increment(b1);

b1.Decrement(b2);

b1.Decrement(b1);

}

}

***Part Four: -* Writing a program*. Write a java program based on the information given to you for the following three questions (10-12). Make your writing neat and provides comment if it is possible to make the program more readable. Use the attached blank paper for your answers (25 marks)***

10. Write java program to calculate area of a circle and circumference of a circle. Define a sub class by the name Cylinder and write java code to implement area of a cylinder and volume of a cylinder (10 marks).

11. Write Java Program to implement private, public and protected access modifier (Use Area of Rectangle and area of Triangle for your work)(5 points).

12. Write simple java program to implement both method overloading and overriding based on the following information. Use Class A as a super class and class B and C as a subclass, where B inherit properties and methods of class A and C inherits both the properties and methods of class B and A. You can use any kind instance variables and methods which do not violate the java convention about method and variable declaration to implement this activity (10) marks.