B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.   **Semester: III**

Branch: Computer Science and Engineering (Data Science)   **Duration: 3 hrs.**

Course Code: 23DS3PCOOJ   **Max Marks: 100**

Course: Object Oriented Programming with java

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Interpret the features of Java.	CO1	PO1	**05**
	b)		Write a program to create a class rectangle with member variables length, breadth and member functions read, display to read and display the member variables. Write member function to calculate_area() to compute area of the rectangle. Write a driver class to create 15 objects and compute area of all these objects.	CO1	PO1	**05**

	c)		Predict the output with reasons and rectify
			class Student{
			int rollno;
			String name;
			float fee;
			Student(int rollno,String name,float fee){
			rollno=rollno;
			name=name;
			fee=fee;
			}
			void display(){System.out.println(rollno+""+name+" "+fee);}
			}
			class TestThis1{
			public static void main(String args[]){
			Student s1=new Student(111,"ankit",5000f);
			Student s2=new Student(112,"sumit",6000f);
			s1.display();
			s2.display();
			}
			}
				CO2	PO2	**05**

	d)		Find the error in the following code and justify your answer.
			class A{
			int a=40;
				CO2	PO2	**05**

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```
public void display()
{
  System.out.println("in method display");
}
public static void main(String args[]){
System.out.println(a);
}
```

OR

2	a)	Java is platform independent language. Justify with the reasons	*CO1*	*PO1*	**05**
	b)	Is it possible to define two or more methods within the same class that share the same name? Justify your answer with suitable example and identify the concept behind it	*CO1*	*PO1*	**05**
	c)	Define a class named Shop with the following description: **Instance variables:** String itemName – to store the name of the item. double itemPrice – to store the price of the item. int quantity – to store the quantity of the item purchased. **Member methods:** Shop() – A default constructor to initialize the data members. void inputDetails() – To input and store the name, price, and quantity of the item. void calculateBill() – To calculate the total bill amount after applying a discount based on the following criteria: Total bill ≤ ₹500: No discount Total bill > ₹500 and ≤ ₹2000: 5% discount Total bill > ₹2000: 10% discount void displayBill() – To display the name of the item, quantity, and the final bill amount after applying the discount. Write a main method to create an object of the class and call the above member methods.	*CO1*	*PO1*	**05**
	d)	Complete the code to get the output given below without making any changes in the main class. **Output:** **hello in default** **hello in parametrized** class A{ A(){ **//write the code here** } A(**int** x){ **//write the code here** } } class TestThis5{ public static void main(String args[]){ A a=new A(10); }}	*CO2*	*PO2*	**05**

			UNIT - II			
3	a)		Explain the types of inheritance.	CO1	PO1	**06**
	b)		Write a Java program to create a vehicle class hierarchy. The base class should be Vehicle, with subclasses Truck, Car and Motorcycle. Each subclass should have properties such as make, model, year, and fuel type. Implement methods for calculating fuel efficiency, distance traveled, and maximum speed.Also write the driver class to create and invoke the methods of the classes.	CO3	PO3	**08**
	c)		Predict the output and justify your answer	CO2	PO2	**06**

```java
class Building
{
   Building()
   {
     System.out.println("Building");
   }
   Building(String name)
   {
     this();
     System.out.println("Building: " + name);
   }
}
 class House extends Building
{
   House()
   {
     System.out.println("House ");
   }
   House(String name)
   {
     this();
     System.out.println("String Constructor: " + name);
   }
}
class Main
{
   public static void main(String[] args)
    {
     House h1=new House("Namma Mane");
    }
}
```

			OR			
4	a)		Create a package named mypack1 containing a class Triangle with a method area() that calculates and returns the area of a triangle. The base and height of the triangle should be provided as parameters to the area() method. Create another package named mypack2 containing a class TriangleArea that imports the mypack1.Triangle class. The TriangleArea class should create an object of the Triangle class, pass the base and height, invoke the area() method, and display the calculated area.	CO3	PO3	**05**

| | | b) | Design a vehicle rental system that has an interface named RentalService with the following methods:

rentVehicle(int hours): Calculates and returns the rental cost based on the number of hours.

vehicleDetails(): Displays the details of the vehicle.

Create two classes that implement the RentalService interface:

CarRental: Implements rental service for cars. The cost is ₹300 per hour.

BikeRental: Implements rental service for bikes. The cost is ₹100 per hour.

Write a Main class where the user can choose the type of vehicle (Car or Bike), provide the number of rental hours, and view the rental cost and vehicle details. | *CO3* | *PO3* | **08** |

| | | c) | Predict the output and Justify your answer. | *CO2* | *PO2* | **07** |

i) class Base

```java
class Base
{
        final public void show()
        {
                System.out.println("Base::show() called");
        }
}
class Derived extends Base
{
        public void show()
        {
                System.out.println("Derived::show() called");
        }
}
class Main
{
        public static void main(String[] args)
        {
                Base b = new Derived();
                b.show();
        }
}
```

ii) class Alpha

```java
class Alpha
{
        public String type = "a ";
        public Alpha() { System.out.print("alpha "); }
}

class Beta extends Alpha
{
        public Beta() { System.out.print("beta "); }

        void go()
        {
                type = "b ";
                System.out.print(this.type + super.type);
```

```
                }
        }
        class Main
        {
                public static void main(String[] args)
                {
                        new Beta().go();
                }
        }
```

			UNIT - III			
5	a)		Explain the keywords of exceptions.	CO1	PO1	**05**
	b)		Develop a program to create a class student with usn name and marks of three subjects that have member variables. Write input and output methods to read and display values. Also write compute_total() method which calculates the total marks. Write user defined exception that would be thrown if the total marks exceeds 300.	CO3	PO3	**08**
	c)		Write a Java program to create a method checkVowels(String input) that takes a string as input and throws an exception if the string does not contain any vowels (a, e, i, o, u in both uppercase and lowercase). Use the throws keyword in the method signature. The program should handle the exception and display an appropriate message to the user.	CO3	PO3	**07**
			OR			
6	a)		Develop a program to create two threads and fetch the name of the threads and priority of the thread.	CO1	PO1	**05**
	b)		Write a Java program to create a basic Java thread that prints "Today is Java SEE!" when executed.	CO1	PO1	**05**
	c)		Design a multithreaded based solution to avoid incorrect transactions, when two parties are performing different operations simultaneously on the same account in a banking system.	CO3	PO3	**10**
			UNIT - IV			
7	a)		Write a Java program to read file content line by line.	CO1	PO1	**05**
	b)		Write a program to write the following content to the file ouptput.txt using printwriter **This is a file handling in Java.**	CO1	PO1	**05**
	c)		Write a program to read the data from the key board using buffered reader.	CO1	PO1	**05**
	d)		Write a program to get the following output using printf My name is Radha and my age is 21	CO1	PO1	**05**
			OR			
8	a)		i)String str="hello" String s= new String("hello"); Differentiate the above two statements. ii)String s=new String("hello");	CO2	PO2	**05**

			How many memory locations are allocated when this statement is executed.			

		b)	Complete the given code to get **output : 20,100**
			Class example{
			Int x,int y
			Void Example()
			{
			}
			Void Example(int p,int q)
			{
			 x=p;
			y=q;
			}
			…..
			}
			Class demo{
			Public static void main(String args[])
			{
			Example e1=new Example(20,100);
			System.out.println(e1);
			}
				CO2	PO2	**05**

		c)	Develop a program to perform the following tasks:
			
			  i) Assign a different char at pos 3 in a string "Bagalkot"
			  ii) Convert the string "A reader lives a thousand lives before he dies . The man who never reads lives only once." to array of characters
			  iii) Given the strings
			     String s1= "My college"
			     String s2=" My college"
			     String s3="BMS college "
			Write appropriate code to compare s1 with s2 and s1 with s3 for equal strings and also using compareTo function to compare the given region of string s1 with string s2,
			demonstrate the difference between equals and ==.
			  iv) To search good in a string s1="good Student" and s2="Student is studying".
			  v) Extract a substring good in the string s2=" good morning"
				CO1	PO1	**10**

			UNIT - V			
	9	a)	Give the general form of generic class and Illustrate a generic class having two type parameters with an example.	CO1	PO1	**10**
		b)	Develop a program to create a generic class that has array of elements as member variables and methods to input(), display() and compute() to compute the sum of odd elements and even elements.	CO3	PO3	**10**
			OR			

	10	a)	Discuss java collection frameworks.	CO1	PO1	**05**
		b)	Develop a Program to demonstrate add, add first, addlast, clear and display the elements in ArrayDeque.	CO1	PO1	**05**
		c)	Write a program to implement add(), addFirst() and addLast() methods to add the elements at the desired locations in the LinkedList,	CO1	PO1	**05**
		d)	Write a program to illustrate various methods of hashset.	CO1	PO1	**05**

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