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RV COLLEGE OF ENGINEERING®
 (An Autonomous Institution affiliated to VTU)
IV Semester B. E. Grade Improvement Examinations October-2021
Computer Science and Engineering
OBJECT ORIENTED PROGRAMMING USING JAVA

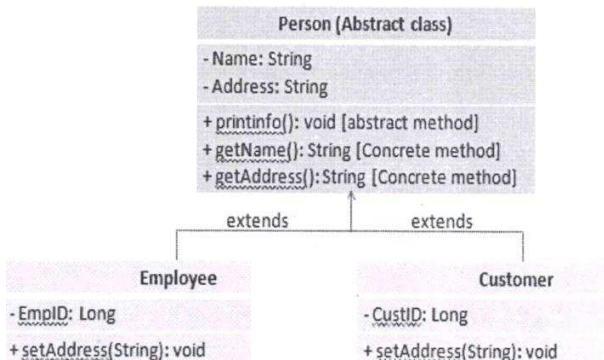
*Time: 03 Hours**Maximum Marks: 100***Instructions to candidates:**

Answer any FIVE full questions out of TEN. Each carries 20 marks.

1	1.1	Justify the statement “write once and run anywhere” feature of JAVA.	02
	1.2	Differentiate between method overloading and method overriding in Java.	02
	1.3	Predict the output of following program and provide justification for the same.	
		<pre> 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(); } } </pre>	02
	1.4	How many threads are created by the following code snippet? Justify your answer.	
		<pre> class Test extends Thread { public void run () { System.out.println("Run"); } } class Myclass { public static void main(string[] args) { Test t = new Test(); t.start(); } } </pre>	02

1.5	<p>Predict the output of following program and provide justification for the same.</p> <pre> interface Z { int j = 6; } class A implements Z { void f() { j = 20; System.out.println("i="+i); } } public class Main { public static void main(String[] args) { A obj = new A(); obj.f(); } } </pre>	02
1.6	<p>Predict the output of following program and provide justification for the same.</p> <pre> public class XYZ { public static void main(String []args) { try { int x; return; } catch(ArithmeticException e){ System.out.print("Catch 2 "); } catch(RuntimeException e){ System.out.print("Catch 3 "); } finally { System.out.println("Finally"); } System.out.println("Hello"); System.out.println("Hello"); } } </pre>	02
1.7	<p>Predict the output of following program and provide justification for the same.</p> <pre> public class Test { public static void main(string[] args) { int temp = 9; int data = 8; System.out.println(temp &data); } } </pre>	02

1.8	Predict the output of following program and provide justification for the same.	<pre> public class Test { int x = 2; Test(int i) { x = i; } public static void main(String[] args) { Test t = new Test(5); System.out.println("x = " + t.x); } } </pre>	02
1.9	Provide the syntax for the three different constructors for creating Buttons Control in JavaFX.		02
1.10	Differentiate between Map and Set with respect to Java Collection Framework.		02
2	a	Develop a class diagram for a simplified banking system, indicating attributes, operations, visibility, multiplicities, relationships and aggregations/compositions wherever appropriate. The requirements are as follows: A bank has many branches. In each zone, one branch is designated as the zonal head office that supervises the other branches in that zone. Each branch can have multiple accounts and loans. An account may be either a savings account or a current account. A customer may open both a savings account and a current account. However a customer must not have more than one savings account or current account. A customer may also procure loans from the bank. Write down any assumptions that you made if they help to explain your answer.	10
	b	Explain the importance and usage of static keyword with respective variable, method and class in Java.	05
	c	Differentiate between signed and unsigned right shift operators in Java. Perform signed and unsigned right shift by 1 <i>bit</i> with respect to a number $a = -60$. Assume 32 <i>bit</i> binary format is used to represent the integer.	05
3	a	Design a class diagram for the given scenario. In a university, there are different departments and rooms. Each room can be a classroom or office room or faculty cabin. A department has a name and it contains many offices. A person working at the university has a unique ID and can be a professor or an employee. A professor can be a full time professor, associate or assistant professor and he/she is enrolled in one seats. Every employee works in an office. Write down any assumptions that you made if they help to explain your answer.	10
	b	Differentiate between structured programming and object oriented programming paradigms.	05
	c	With suitable example, explain the following in Java. i. <i>for – each</i> loop ii. Logical and relational operators.	05

4	<p>a</p> <p>Design and implement two interfaces called MobilePhone and MobileInterface.</p> <ul style="list-style-type: none"> • MobilePhone Interface has two abstract methods <ul style="list-style-type: none"> ○ Void makeACall(Long number, Integer CountryCode) and ○ booleansendSMS(string message) • MobileInterface Interface extends MobilePhone Interface and has 3 methods <ul style="list-style-type: none"> ○ Static method called void printWelcomeMessage() ○ Implemented method interface called void makeACall(Long number) ○ abstract method called void capturePhoto() • Develop two classes BasicPhone implementing MobilePhone Interface and Smartphone implementing MobileInterface <p>b</p> <p>Write appropriate main method to invoke the above functionalities. Discuss the different types of inheritance with schematic diagram for developing an application for University Management System.</p>	<p>12</p> <p>08</p>
5	<p>a</p> <p>Design class hierarchy in Java to demonstrate the following hierarchical abstraction among objects.</p>  <pre> classDiagram class Person { <<abstract>> -Name: String -Address: String +printinfo(): void +getName(): String +getAddress(): String } class Employee { -EmpID: Long +setAddress(String): void } class Customer { -CustID: Long +setAddress(String): void } Person < -- Employee Person < -- Customer </pre> <p>Demonstrate the two usages of super keyword for the above scenario. Demonstrate the concept of method overriding at appropriate place. Demonstrate the concept of referencing subclass object using super class reference.</p> <p>b</p> <p>Write a Java program with suitable main () method to exercise the above functionalities and display appropriate details of each class. Demonstrate the following concepts with respect to interfaces with appropriate Java program.</p> <ol style="list-style-type: none"> Nested Interfaces (nested inside class) Nested Interfaces (nested inside interface) <p>Write appropriate main () method to invoke the interface functionalities as mentioned above.</p>	<p>12</p> <p>08</p>
6	<p>a</p> <p>Write a Java program to find the number of divisors for the given input number N. The value N is a positive integer that should be read from the console terminal. If the user enters a negative value or a character or a string, the program should throw an “unchecked user defined exception” called as <i>NegativeValueException</i> and print appropriate error message.</p> <p>b</p> <p>Explain the two ways of creating thread in Java with appropriate example code.</p> <p>c</p> <p>List and discuss different types of exceptions in Java with appropriate examples.</p>	<p>08</p> <p>08</p> <p>04</p>

7	a	Discuss which concept in multi-threading helps to eliminate polling in Java. Demonstrate the same concept to implement Java program for classic queuing problem where one thread is producing some data and another is consuming it. Assume that the producer has to wait until the consumer is finished before it generates more data and vice-versa.	07
	b	Discuss the usage of throw and throws keyword in propagating checked exceptions with example Java code snippet.	07
	c	Describe the different states involved in the life cycle of the Java thread. Illustrate its different operations involved in switching from one state to another.	06
8	a	Write a generic functional interface palindrome <T, U> in Java to return true if a number or string is a palindrome and false if it is not. Here 'T' is type of input parameters and 'U' is a return type.	10
	b	Discuss any four methods of matcher class. Write a regular expression to split the given input string "I study in RVCE. I am Part of an Art Club at RVCE. This club at RVCE arranges many Art events" on patterns RVCE, Art and Club.	10
9	a	Write a Java program using regular expression that ends with atleast two digits.	07
	b	Discuss the functionalities of any four methods of matcher class.	06
	c	Write a Java program using generic functional interface to <ul style="list-style-type: none"> i. Compute factorial of a number taking it as input parameter to the function. ii. Reverse a string taking it as input parameter to the function. 	07
10	a	Create a simple JavaFX form containing two radio buttons depicting nationality of the person as "Indian" and "NRI". When either of the radio buttons is clicked/selected, it should display "Nationality: Indian" or "Nationality: Non-Resident Indian".	10
	b	How LinkedList class is different from ArrayList class in Java Collection Framework? Build an ArrayList of strings and traverse the ArrayList using Iterator interface.	10