GRAPHIC ERA (DEEMED TO BE UNIVERSITY), DEHRADUN

SEMESTER IV

Name of Department: - Computer Science and Engineering

1. Subject Code: **PCS-408** Course Title: **Java Programming Lab**
2. Contact Hours: **L:** **0** **T**: **1** **P**: **2**
3. Examination Duration (Hrs): **Theory** **0** **Practical** **3**
4. Relative Weight: **CIE** **25** **MSE** **25** **SEE** **50**
5. Credits: **2**
6. Semester: **IV**
7. Category of Course: **DC**
8. Pre-requisite: PCS-307 OOPS with C++ Lab, TCS 307 Object oriented Programming with C++

9. **Course Outcome**:**	After completion of the course the students will be able to: CO1: Understand the object-oriented approach in programming along with the purpose and usage principles of inheritance, polymorphism, encapsulation, and method overloading etc. CO2: Demonstrate ability to test and debug Java programs using IDE. CO3: Analyze, design, and develop small to medium sized application programs that demonstrate professionally acceptable programming standards. CO4: Demonstrate skills of developing event-driven programs using graphical user interfaces. CO5: Demonstrate skills of developing event-driven programs using graphical user interfaces.

*** Describe the specific knowledge, skills or competencies the students are expected to acquire or demonstrate.*

10. **Details of the Course:**

Sl. No.	List of problems for which student should develop program and execute in the Laboratory	Contact Hours
22	**Taking input from Command line and convert objects into primitivedata type:** Write a java program to take input as a command line argument. Your name, course, universityrollno and semester. Display the information. Name: UniversityRollNo:Course:	2

	Semester:	
23	**Concepts of Java Control statements, Conditional statements, loops and iterations, Wrapper classes, Scanner Class:** Using the switch statement, write a menu-driven program to calculate the maturity amount of a bank deposit. The user is given the following options: (i) Term Deposit (ii) Recurring Deposit For option (i) accept Principal (p), rate of interest (r) and time period in years (n). Calculate and output the maturity amount (a) receivable using the formula a = p[1 + r / 100]n. For option (ii) accept monthly installment (p), rate of interest (r) and time period in months (n). Calculate and output the maturity amount (a) receivable using the formula a = p * n + p * n(n + 1) / 2 * r / 100 * 1 / 12. For an incorrect option, an appropriate error message should be displayed. [Use Scanner Class to take input]	2
24	Program to find if the given numbers are Friendly pair or not (Amicable or not). **Friendly Pair** are two or morenumbers with a common abundance. **Input & Output format:** • Input consists of **2 integers**. • The first integer corresponds to number 1 andthe second integer corresponds to number 2. If it is a Friendly Pair display **Friendly Pair** or displays Not Friendly Pair. For example,6 and 28 are Friendly Pair. (Sum of divisors of 6)/6 = (Sum of divisors of 28)/28. Steps to check whether the given numbers are friendly pair or not ▪ Input the numbers num1 and num2. ▪ Initialize sum1 = sum2 = 0. ▪ sum1 = sum of all divisors of num1. ▪ sum2 = sum of all divisors of num2. ▪ If (sum1 == num1) and (sum2 == num2), then print "Abundant Numbers". ▪ Else, print "Not Abundant Numbers". Program to check whether the given numbers are friendly pair or not	2
25	Program to replace all 0's with 1 in a given integer. Given an integer as an input, all the 0's in the number has to be replaced with 1. For example, consider the following number Input: 102405 **Output: 112415** **Input: 56004** **Output: 56114** Steps to replace all 0's with 1 in a given integer	2

	• Input the integer from the user. • Traverse the integer digit by digit. • If a '0' is encountered, replace it by '1'. • Print the integer.	
26	**Array in Java:** Printing an array into Zigzag fashion. Suppose youwere given an array of integers, and you are told to sort the integers in a zigzag pattern. In general, in a zigzag pattern, the first integer is less than the second integer, which is greater than the third integer, which is less than the fourth integer, and so on. Hence, the converted array should be in the form of e1 < e2 > e3 < e4 > e5 < e6. **Test cases: Input 1:** 7 4 3 7 8 6 2 1 **Output 1:** 3 7 4 8 2 6 1 **Input 2:** 4 1 4 3 2 **Output 2:** 1 4 2 3	2
27	The problem to rearrange positive and negative numbers in an array . Method: This approach moves all negative numbers to the beginning and positive numbers to the end butchanges the order of appearance of the elements of the array. Steps: 1. Declare an array and input the array elements. 2. Start traversing the array and if the current element is negative, swap the current elementwith the first positive element and continue traversing until all the elements have been encountered. 3. Print the rearranged array. Test case: • Input: 1 -1 2 -2 3 -3 Output: -1 -2 -3 1 3 2	2
28	Program to find the saddle point coordinates in a given matrix. A saddle point is an element of the matrix,which is the minimum element in its row and the maximum in its column.	2

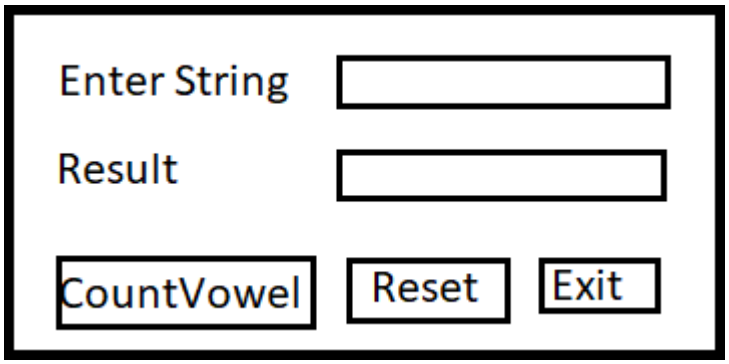
	For example, consider the matrix given belowMat [3][3] 1 2 3 4 5 6 7 8 9 Here, 7 is the saddle point because it is the minimum element in its row and maximum element in its column. Steps to find the saddle point coordinates in a givenmatrix. 1. Input the matrix from the user. 2. Use two loops, one for traversing the row andthe other for traversing the column. 3. If the current element is the minimum element inits row and maximum element in its column, then return its coordinates. Else, continue traversing.	
29	**String Handling in Java (using String and StringBuffer class):** Program to find all the patterns of 0(1+)0 in the given string. Given a string containing 0's and 1's, find the total number of 0(1+)0 patterns in the string and output it. 0(1+)0 - There should be at least one '1' between the two 0's. For example, consider the following string. **Input:** 01101111010 **Output:** 3 **Explanation: 0110**1111010 - count = 1	2
30	Write a java program to delete vowels from given string using StringBuffer class	2
31	**Class definition, creating objects and constructors:** Write a java program to create a class named 'Bank ' with the following data members: • Name of depositor • Address of depositor • Account Number • Balance in account **Class 'Bank' has a method for each of the following:** 1. Generate a unique account number for each depositor. 2. For first depositor, account number will be 1001, for second depositor it will be 1002 and so on 3. Display information and balance of depositor 4. Deposit more amount in balance of any depositor 5. Withdraw some amount from balance deposited. 6. Change address of depositor	2

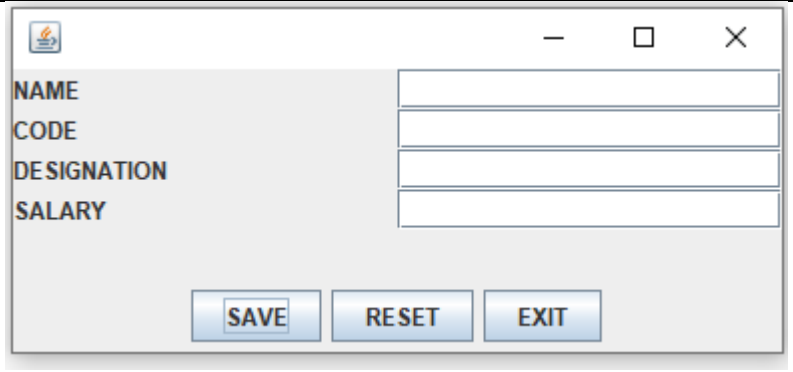
	After creating the class, do the following operations. 1. Enter the information (name, address, account number, balance) of the depositors. Number of depositors is to be entered by the user. 2. Print the information of any depositor. 3. Add some amount to the account of any depositor and then display final information of that depositor. 4. Remove some amount from the account of any. depositor and then display final information of that depositor. 5. Change the address of any depositor and then display the final information of that depositor. 6. Randomly repeat these processes for some other bank accounts.	
32	Define a class **Word Example** having the followingdescription: Data members/instance variables: private String strdata: to store a sentence. **Parameterized Constructor WordExample(String)** : Accept a sentence which may be terminated by either'.', '? 'or'!' only. The wordsmay be separated by more than one blank space and are in UPPER CASE. **Member Methods:** **void countWord():** Find the number of wordsbeginning and ending with a vowel. **void placeWord():** Place the words which begin andend with a vowel at the beginning, followed by the remaining words as they occur in the sentence	2
33	**Method overloading (Compile time Polymorphism):** Write a Java program to create a class called **ArrayDemo** and overload arrayFunc() function. **void arrayFunc(int [], int)** □ To find all pairs of elements in an Array whose sum is equal to a givennumber : Array numbers= [4, 6, 5, -10, 8, 5, 20], target=10 **Output :** Pairs of elements whose sum is 10 are :4 + 6 = 10 5 + 5 = 10 -10 + 20 = 10 **void arrayFunc(int A[], int p, int B[], int q)** □ Giventwo sorted arrays A and B of size p and q, Overload method arrayFunc() to merge elements of A with B bymaintaining the sorted order i.e. fill A with first p smallest elements and fill B with remaining elements. Example: Input :	2

	int[] A = { 1, 5, 6, 7, 8, 10 } int[] B = { 2, 4, 9 } Output: Sorted Arrays: A: [1, 2, 4, 5, 6, 7] B: [8, 9, 10] **(Use Compile time Polymorphism MethodOverloading)**	
34	**Method overriding (Runtime Polymorphism), Abstract class and Abstract method, Inheritance, interfaces:** Write a java program to calculate the area of a rectangle, a square and a circle. Create an abstract class 'Shape' with three abstract methods namely rectangleArea() taking two parameters, squareArea() and circleArea() taking one parameter each. Now create another class 'Area' containing all the three methods rectangleArea(), squareArea() and circleArea() for printing the area of rectangle, square and circle respectively. Create an object of class Area and call all the three methods. **(Use Runtime Polymorphism)**	2
35	Write a java program to implement abstract class andabstract method with following details: **Create a abstract Base Class TemperatureData members:** double temp; **Method members:** void setTempData(double) abstact void changeTemp() **Sub Class Fahrenheit (subclass of Temperature) Data members**: double ctemp; **method member:** Override abstract method changeTemp() to convert Fahrenheit temperature into degree Celsius by using formula C=5/9*(F-32) and display converted temperature Sub Class Celsius (subclass of Temperature) **Data member:** double ftemp; **Method member:** Override abstract method changeTemp() to convert degree Celsius into Fahrenheit temperature by using formula F=9/5*c+32 and display converted temperature	2
36	Write a java program to create an interface that consists of a method to display **volume ()** as an abstract method and redefine this method in the derived	2

	classes to suit their requirements. Create classes called **Cone**, **Hemisphere** and **Cylinder** that implements the interface. Using these three classes, design a program that will accept dimensions of a cone, cylinder and hemisphere interactively and display the volumes. Volume of cone = (1/3)πr2h Volume of hemisphere = (2/3)πr3 Volume of cylinder = πr2h	
37	Write a java program to accept and print the employee details during runtime. The details will include employee id, name, dept_ Id. The program should raise an exception if user inputs incomplete or incorrect data. The entered value should meet the following conditions: a. First Letter of employee name should be in capital letter. b. Employee id should be between 2001 and 5001 c. Department id should be an integer between 1 and 5. If the above conditions are not met, then the application should raise specific exception else should complete normal execution.	2
38	Create a class MyCalculator which consists of a single method power (int, int). This method takes two integers, n and p, as parameters and finds np. If either n or p is negative, then the method must throw an exception which says, "n and p should be non- negative". **Input Format** Each line of the input contains two integers, n and p. Output Format Each line of the output contains the result, if neither of n and p is negative. Otherwise, the output contains "n and p should be non- negative". **Sample Input** 3 5 2 4 0 0 -1 -2 -1 3 **Sample Output** 243 16 java.lang.Exception: n and p should not be zero. java.lang.Exception: n or p should not be negative. java. lang. Exception: n or p should not be negative. **Explanation** In the first two cases, both n and p are positive. So, the power function returns the answer correctly.	2

	In the third case, both n and p are zero. So, the exception, "n and p should not be zero." is printed. In the last two cases, at least one out of n and p is negative. So, the exception, "n or p should not be negative." is printed for these two cases.	
39	**File Handling in Java:** Write a java file handling program to count and display the number of palindromes present in a text file "myfile.txt". Example: If the file "myfile.txt" contains the following lines, My name is NITIN Hello aaa and bbb wordHow are You ARORA is my friendOutput will be => 4	2
40	**Multithreaded programming**: Write a program MultiThreads that creates two threads-one thread with the name CSthread and the other thread named ITthread. Each thread should display its respective name and execute after a gap of 500 milliseconds. Each thread should also display a number indicating the number of times it got a chance to execute.	
41.	Write a java program for to solve producer consumer problem in which a producer produces a value and consumer consume the value before producer generate the next value	2
42	**Collection and Generic Framework:** Write a method removeEvenLength that takes an ArrayList of Strings as a parameter and that removesall the strings of even length from the list. **(Use ArrayList)**	
43	Write a method swapPairs that switches the order of values in an ArrayList of Strings in a pairwise fashion. Your method should switch the order of the first two values, then switch the order of the next two, switch the order of the next two, and so on. For example, if the list initially stores these values: {"four", "score", "and", "seven", "years", "ago"} your method should switch the first pair, "four", "score", the second pair, "and", "seven", and the third pair, "years", "ago", to yield this list: {"score", "four", "seven", "and", "ago", "years"} If there are an odd number of values in the list, the final element is not moved. For example, if the original list had been: {"to", "be", "or", "not", "to", "be", "hamlet"} It would again switch pairs of values, but the final value, "hamlet" would not be moved, yielding this list: {"be", "to", "not", "or", "be", "to", "hamlet"}	2

44	Write a method called alternate that accepts two Listsof integers as its parameters and returns a new List containing alternating elements from the twolists, in the following order: • First element from first list • First element from second list • Second element from first list • Second element from second list • Third element from first list • Third element from second list If the lists do not contain the same number of elements, the remaining elements from the longer list should be placed consecutively at the end. For example, for a first list of (1, 2, 3, 4, 5) and a second list of (6, 7, 8, 9, 10, 11, 12), a call of alternate (list1, list2) should return a list containing (1, 6, 2, 7, 3, 8, 4, 9, 5, 10, 11, 12). Do not modify the parameter lists passed in.	2
45	**AWT & Swing, Event Handling:** Write a GUI program to develop an application that receives a string in one text field, and count number ofvowels in a string and returns it in another text field, when the button named "CountVowel" is clicked. When the button named "Reset" is clicked it will resetthe value of textfield one and Textfield two. When the button named "Exit" is clicked it will closed the application. 	2
46	**Java Database Connectivity (JDBC):** **Create a database of employee with the following fields.** • **Name** • **Code** • **Designation** • **Salary**	2

	 a) Write a java program to create GUI java application to take employee data from the TextFields and store it in database using JDBC connectivity. b) Write a JDBC Program to retrieve all the records from the employee database.	
	Total	**48**

11**. Suggested Books:**

SL. No.	Name of Authors/Books/Publishers	Edition	Year of Publication / Reprint
	Textbooks		
1.	Patrick Naughton and Herbert Schildt, "Java 2 The Complete Reference", McGraw Hill Education	9th	2017
	E. Balaguruswamy, "Programming with Java a Primer", Tata McGraw Hill	6th	**2019**
	Reference Books		
1.	Core Java-Head First Publication	3rd	2018
	Cay S Horstmann and Gary Cornell, "Core Java Volume –I and II", Sun Microsystems,	Standard edition	**2019**

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam