JAVA PROGRAMMING LAB
(Common to CSE, IT and AI&DS)
II Year – I Semester

Practical: 4	Internal Marks : 15
Credits : 2	External Marks : 35

Course Objectives

- To demonstrate object oriented programming concepts.
- To introduce the creation of GUI using AWT components.

Course Outcomes

Upon successful completion of the course, the students will be able to

- apply the concept of object oriented approach in problem solving.
- create packages for reusability.
- examine exceptions and multi-tasking.
- create GUI applications to handle events

List of Exercises

Exercise-1

1. John found another manuscript of ancient mathematicians. According to this manuscript an integer k is a lucky number if k = a1 + a 2 + ... + a n , where : $a_i = 7^p$. p may be any positive integer. if i and j are distinct, a_i != a_j

   For example 7 is a lucky number: $7 = 7^1$. 56 is a lucky number $56 = 7^2 + 7^1$.

   John has an array of n integers. He wants to determine how many members of this array are lucky. He is not good at programming and needs your help. Write a program which takes an integer n and array consisting of n integers and determines quantity of lucky integers in this array.

   Input

   The first line of input contains integer n: number of elements in the array. The second line of input contains n space separated integers.

   Output

   Print the number of lucky integers in a given array.

   Constraints

   1 <= n <= 100

   1 <= arr[i] <= 1000000. arr[i] is the ith element of array.

   Example #1

   Input

   2

   49 50

   Output

1

$49 = 7^2$. 50 can't be represented as a sum of distinct powers of 7.

Example #2

Input

2

7 49

Output

2

$7 = 7^1$ and $49 = 7^2$.

2. Write a Java program that reads an integer number (between 1 and 255) from the user and prints the binary representation of the number. The answer should be printed as a String.

   Note: The output displayed should contain 8 digits and should be padded with leading 0s(zeros), in case the returned String contains less than 8 characters. ***For example***, if the user enters the value 16, then the output should be 00010000 and if the user enters the value 100, the output should be 01100100 (Hint : You may use String.format() method for the expected output)

Exercise-2

3. Software is being developed by a university that displays SGPA of your current semester. You are given the task to develop a module that calculates the SGPA with respect to the secured grade points corresponding to given number of credits in each subject. The credits for the courses are:

   Graphics: 2, PPS: 4, JAVA: 3, Chemistry: 3, English: 2, Technical Skills: 1.5, Data Structures: 4

   Complete your Module by displaying the SGPA of current semester.

4. You are given a string consisting of n lowercase Latin letters. You must find the count of number of larger alphabets for every character of the string (according to lexicographical order).

   Input

   The first line of input contains an integer n, the length of the given string.

   The second line of input contains a string.

   Output

   Print the count of number of larger alphabets for every character of the string on a single line. Separate elements by white spaces.

   Constraints

   1 <= n <= 100

   Example#1

   Input

   3

   abc

Output
2 1 0
Explanation: a - 2: ‘a’ < ‘b’, ‘a’ < ‘c’. ‘b’ - 1: ‘b’ < ‘c’. ‘c’ - 0: There is no letter in this string, which is larger than ‘c’.
Example#2
Input
5
aaabb
Output
2 2 2 0 0
Explanation: a - 2: ‘a’ < ‘b’ (b at index 3 and index 4). There is no letter in this string, which is larger than ‘b’.

Exercise-3

5. Tom and Jerry found two bags of apples. The bag that Jerry chose contains 5 apples and the bag chosen by Tom has 3 apples. Tom wants to have more apples, so he swaps the bags. Write a program to display the apples in the two bags before and after swapping.
   Hint :-(Try using call by value and call by reference; Write which can be used to swap)
6. Access the instance variables by using ‘this’ and super keywords.

Exercise-4

7. Create an abstract class named shape, that contains an empty method named numberOfSides(). Define three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides(), that contains the number of sides in the given geometrical figure.
8. You are supposed to calculate the area of a polygon based on number of inputs given by the user. Polygon can be a square, a rectangle or a triangle.

Exercise-5

9. Write an interface called Playable, with a method *void play();*
   Let this interface be placed in a package called music.
   Write a class called Veena which implements Playable interface. Let this class be placed in a package music.string
   Write a class called Saxophone which implements Playable interface. Let this class be placed in a package music.wind
   Write another class Test in a package called live. Then,
   a. Create an instance of Veena and call play() method
   b. Create an instance of Saxophone and call play() method
   c. Place the above instances in a variable of type Playable and then call play()

10. Create and access a user defined package where the package contains a class named CircleDemo, which in turn contains a method called circleArea() which takes radius of the circle as the parameter and returns the area of the circle.

Exercise-6

11. Handle the following exceptions using exception handling mechanism in java. (Note: Handle all exceptions in single program using command line arguments)
    a. ArithmeticException **b.** ArrayIndexOutOfBoundsException
    c. NullPointerException **d.** IOException
    e. NumberFormatException
12. Write a java program to create three userdefined exceptions and throw the exceptions using throw and write appropriate catch and finally blocks to handle.

Exercise-7

13. Create three threads (by using Thread class and Runnable interface) where the first thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
14. Create three threads- with different priorities – MAX, MIN, NORM- and start the threads at the same time. Observe the completion of the threads.

Exercise-8

15. Handle keyboard events, which echoes keystrokes to the applet window and shows the status of each key event in the status bar.
16. Display the position of x and y co-ordinates of the cursor movement using mouse.

Exercise-9

17. Design GUI to handle Choice Control event.
18. Design simple arithmetic Calculator using Grid Layout manager.

Text Books

1. Herbert Schildt, "Java - The Complete Reference", 7th edition, TMH.
2. Sachin Malhotra, Saurabh choudhary, "Programming in Java", 2nd edition, Oxford.

Reference Books

1. E. Balagurusamy, "Programming with Java".
2. "Java 8 Programming", Black Book DreamTech,
3. P.Radha Krishna, "Object Oriented Programming through Java", Universities Press.

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