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Department of Computer Science and Engineering
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15CS704: Python Programming

Part-A

1. The finance department of a company wants to calculate the monthly pay of one of its employee. Monthly pay should be calculated as mentioned in the formula below and display all the employee details.
   Monthly Pay= No. of hours worked in a week * Pay rate per hour * No .of weeks in a month
   Write a Python Program to implement the problem.
2. The finance department of a company wants to calculate the monthly net pay of one of its employee by finding the income tax to be paid (in Indian Rupees) and the net salary after the income tax deduction. The employee should pay the income tax based on the following table:

Gross Salary(In Rs)	Tax Percentage
Below 5,000	Nil
5,001 to 10,000	10%
10,001 to 20,000	20%
More than 20,000	30%

   Display the employee id, basic salary, allowances, gross pay, income tax and net pay using Python Programming.
   In the retail application, display the details of the customer like bill id, customer id, bill amount and customer name. But the retail shop wants the customer name to be between 3 to 20 characters. Write a Python Program to implement the case study.
3. Write a Python program to check whether the given string is palindrome or not.
4. Write a Python program to generate first 'n' Fibonacci numbers.
5. Consider the scenario of processing marks of students for a course in student management system. Given below is the list of marks scored by students. Find top three scorers for the course and also display the average marks scored by all students. Implement the solution using Python Programming.

Student Name	Marks Scored
John	86.5
Jack	91.2
Jill	84.5
Harry	72.1
Joe	80.5

6. Write a program to count and display the number of capital letters in a given string.
7. Write a program to count the number of each vowel in a given string.
8. Write a program to remove all punctuations like "'!()-[]{};:'",\,<>,/,?,@,#,$, %^&*_~" from the string provided by the user.
9. Consider two strings, String1 and String2 and display the merged_string as output. The merged_string should be the capital letters from both the strings in the order they appear.
   Sample Input: String1: I Like C String2: Mary Likes Python
   Merged_string should be ILCMLP
10. With a given integral number n, write a program to generate a dictionary that contains (i, i*i) such that is an integral number between 1 and n (both included) and then the program should print the dictionary. Suppose the following input is supplied to the program: 8 Then, the output should be: {1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64}
11. Write a binary search function which searches an item in a sorted list. The function should return the index of element to be searched in the list.
12. Design a class named Rectangle to represent a rectangle. class contains:
    - Two data fields named width and height .
    - A constructor that creates a rectangle with the specified width and height .
    - The default values are 1 and 2 for the width and height, respectively.
    - A method named getArea() that returns the area of this rectangle.
    - A method named getPerimeter() that returns the perimeter.

    Write a test program that creates two Rectangle objects—one with width 4 and height 40 and the other with width 3.5 and height 35.7. Display the width, height, area, and perimeter of each rectangle in this order.
13. Design a class named Account that contains:
    - A private int data field named id for the account.
    - A private float data field named balance for the account.
    - A private float data field named annualInterestRate that stores the current interest rate.
    - A constructor that creates an account with the specified id (default 0), initial balance (default 100), and annual interest rate (default 0).
    - The accessor and mutator methods for id , balance , and annualInterestRate .

- A method named getMonthlyInterestRate() that returns the monthly interest rate.
- A method named getMonthlyInterest() that returns the monthly interest.
- A method named withdraws that withdraws a specified amount from the account.
- A method named deposit that deposits a specified amount to the account.

(Hint: The method getMonthlyInterest() is to return the monthly interest amount, not the interest rate. Use this formula to calculate the monthly interest: balance*monthlyInterestRate. monthlyInterestRate is annualInterestRate / 12 . Note that annualInterestRate is a percent (like 4.5%). You need to divide it by 100 .)

Write a test program that creates an Account object with an account id of 1122, a balance of $20,000, and an annual interest rate of 4.5%. Use the withdraw method to withdraw $2,500, use the deposit method to deposit $3,000, and print the id, balance, monthly interest rate, and monthly interest.

14. Write a function that returns the number of days in a year using the following header:
    def numberOfDaysInAYear(year):
    Write a test program that displays the number of days in the years from 2010 to 2020.
15. (Display matrix of 0s and 1s) Write a function that displays an n-by-n matrix using the following header:
    def printMatrix(n):
    Each element is 0 or 1, which is generated randomly. Write a test program that prompts the user to enter n and displays an n-by-n matrix.
    Sample run:
    Enter n: 3
    0 1 0
    0 0 0
    1 1 1
16. Suppose there are eight students and ten questions and each row records a student's answers to the questions, as shown in the following illustration.

	Students' Answers to the Questions:									
	0	1	2	3	4	5	6	7	8	9
Student0	A	B	A	C	C	D	E	E	A	D

Student1	D	B	A	B	C	A	E	E	A	D
Student2	E	D	D	A	C	B	E	E	A	D
Student3	C	B	A	E	D	C	E	E	A	D
Student4	A	B	D	C	C	D	E	E	A	D
Student5	B	B	E	C	C	D	E	E	A	D
Student6	B	B	A	C	C	D	E	E	A	D
Student7	E	B	E	C	C	D	E	E	A	D

The key is stored in the following way:

	Key to the Questions:									
	0	1	2	3	4	5	6	7	8	9
Key	D	B	D	C	C	D	A	E	A	D

Write a program that grades multiple-choice tests for the above scenario.

17. (Find the index of the smallest element) Write a function that returns the index of the smallest element in a list of integers. If the number of such elements is greater than 1, return the smallest index. Use the following header:
    def indexOfSmallestElement(lst):
    Write a test program that prompts the user to enter a list of numbers, invokes this function to return the index of the smallest element, and displays the index.
18. Write the following function that tests whether the list has four consecutive numbers with the same value:
    def isConsecutiveFour(values):
    Write a test program that prompts the user to enter a series of integers and reports whether the series contains four consecutive numbers with the same value.
19. Write a program that will count the number of characters, words, and lines in a file. Words are separated by a white-space character. Your program should prompt the user to enter a filename.
20. Suppose that a text file contains an unspecified number of scores. Write a program that reads the scores from the file and displays their total and average. Scores are separated by blanks. Your program should prompt the user to enter a filename.

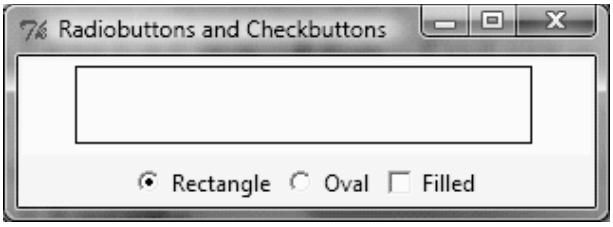
PART-B

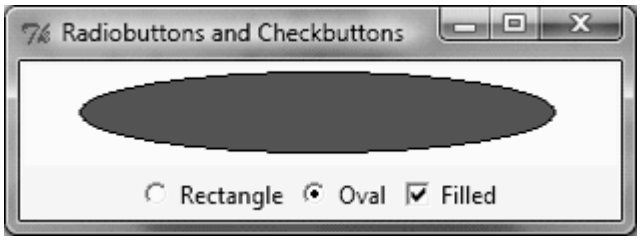
21. Design a class named Triangle that extends the GeometricObject class. The Triangle class contains:
    - Three float data fields named side1 , side2 , and side3 to denote the three sides of the triangle.
    - • A constructor that creates a triangle with the specified side1 , side2 , and side3 with default values 1.0 .
    - The accessor methods for all three data fields.
    - A method named getArea() that returns the area of this triangle.

- A method named getPerimeter() that returns the perimeter of this triangle.
- A method named _ _str_ _() that returns a string description for the triangle.

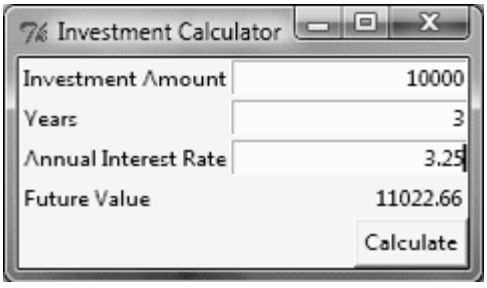
Write a test program that prompts the user to enter the three sides of the triangle, a color, and 1 or 0 to indicate whether the triangle is filled. The program should create a Triangle object with these sides and set the color and filled properties using the input. The program should display the triangle's area, perimeter, color, and True or False to indicate whether the triangle is filled or not.

22. Write a program that draws a rectangle or an oval, as shown in Figure below: The user selects a figure from a radio button and specifies whether it is filled by selecting a check button.



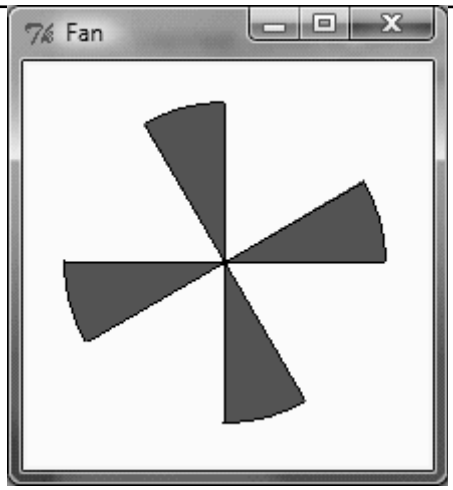


23. Write a program that calculates the future value of an investment at a given interest rate for a specified number of years. The formula for the calculation is as follows: futureValue = investmentAmount * (1 + monthlyInterestRate) $^{years * 12}$



Use text fields for users to enter the investment amount, years, and interest rate. Display the future amount in a label field when the user clicks the Calculate button, as shown in Figure above.

24. Write a program that displays a still fan, as shown in Figure below:



25. Define an exception class named TriangleError that extends RuntimeError . The TriangleError class contains the private data fields side1 , side2 , and side3 with accessor methods for the three sides of a triangle. Modify the Triangle class in Exercise 11 to throw a TriangleError exception if the three given sides cannot form a triangle.
26. Write a program to read a string. Create two threads such that the first thread should check whether the string is a palindrome or not and the second thread should count the number of vowels in the string.
27. Design a Tkinter interface to perform the following operations on a database by considering the table Student (USN: String, Name: String, Age: Int, Branch: String). Display the success and failure message using MessageBox
    a. Insert student details
    b. Search the student details with USN="4NM06CS001"
28. Design a Tkinter interface to perform the following operations on a database by considering the table Employee (SSN:Int, Fname: String, LName: String, Age: Int, Place: String, Salary: Int). Display the success and failure message using MessageBox
    a. Insert employee details
    b. Delete the details of employee whose id = 1001 and place = "XYZ"
    c. Update the employee details.
29. Write a Client/Server Socket program to demonstrate the file transfer operation using Python Programming.
30. Write a client/server program where the client program takes the expression (n1 op n2 where n1 and n2 are operands and op can be +,-,*,/) from the user and sends the expression to the server program. The server program performs the specified operation and sends the result to the client program and displays it on the user's console.
31. Write a CGI script to demonstrate the concept of check button.

32. Write a CGI script to demonstrate the concept of radio button.

Evaluation

Evaluation Component	Evaluation Criteria	Marks
Part-A	Write up	5
	Execution	10
Part-B	Write up	10
	Execution	15
Viva-Voce		10
Total		50