SET 1

18CSC207J-Advance Programming Practice - Structured Programming – Lab Programs

1. Three numbers, a, b and c, are called a Pythagorean triple if $a^2 + b^2 = c^2$. An example is the triple 3, 4 and 5, since 9 + 16 = 25. Pythagorean triples can represent, for example, the length of sides in a right triangle. Write a series of Python statements that will read three numbers into variables named a, b and c and then print a message saying whether or not they are a Pythagorean triple.
2. Write a program that will accept as input a series of names and salaries. Using the name "End" to mark the end if the sequence of values. After the values have been entered, print the average salary, and the names and salaries of those individuals with the highest and lowest salary.
3. Using a for loop, print a table of powers of x, where x ranges from 1 to 10. For each value x, print the quantity x, x^2 , and x^3 . Using tab characters in your print statement to make the values line up nicely.
4. Write a program that reads a word, and prints the number of letters in the word, the number of vowels in the word, and the percentage of vowels. Enter a word: sequoia Letters: 7 Vowels: 5 Percentage of vowels: 71.42
5. Write a program that reads a string and returns a table of the letters of the alphabet in alphabetical order which occur in the string together with the number of times each letter occurs. Case should be ignored. A sample output of the program when the user enters the data "ThiS is String with Upper and lower case Letters", would look this this:

a	2
c	1
d	1
e	5
g	1
h	2
i	4
l	2
n	2
o	1
p	2
r	4
s	5
t	5

u	1
w	2

SET 2

1. Consider you are automate the Graduity calculation using the following a program that reads the subtotal and the gratuity rate and computes the gratuity and total. For example, if the user enters 10 for the subtotal and 15% for the gratuity rate, the program displays 1.5 as the gratuity and 11.5 as the total.

2. Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. Ensure the Entered number is between the limit if not prompt the user to reenter the number.

3. Create a Lottery Application to generate a three-digit lottery number. The program prompts the user to enter a three-digit number and determines whether the user wins according to the following rules:

a. If the user input matches the lottery number in the exact order, the award is $10,000.
b. If all the digits in the user input match all the digits in the lottery number, the award is $3,000.
c. If one digit in the user input matches a digit in the lottery number, the award is $1,000.

4. Create a Scissor and Rock simulator that plays the popular scissor-rockpaper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws.

5. Write a program that reads integers, finds the largest of them, and counts its occurrences. Assume that the input ends with number 0. Suppose that you entered 3 5 2 5 5 5 0; the program finds that the largest number is 5 and the occurrence count for 5 is 4. (Hint: Maintain two variables,max and count. The variable max stores the current maximum number, and count stores its occurrences. Initially, assign the first number to max and 1 to count. Compare each subsequent number with max. If the number is greater than max, assign it to max and reset count to 1. If the number is equal to max, increment count by 1.)

SET 3

1. A positive integer is called a perfect number if it is equal to the sum of all of its positive divisors, excluding itself. For example, 6 is the first perfect number, because The next is There are four perfect numbers less than 10,000. Write a program to find these four numbers.

2. (Twin primes) Twin primes are a pair of prime numbers that differ by 2. For example, 3 and 5, 5 and 7, and 11 and 13 are twin primes. Write a program to find all twin primes less than 1,000. Display the output as follows:

3.A prime number is called a Mersenne prime if it can be written in the form 2^n-1 for some positive integer p. Write a program that finds all Mersenne primes with and displays the output as follows:

4. (Financial application: compute future tuition) Suppose that the tuition for a university is $10,000 this year and increases 5% every year. Write a program that computes the tuition in ten years and the total cost of four years' worth of tuitionstarting ten years from now.

5. (Find the two highest scores) Write a program that prompts the user to enter the number of students and each student's score, and displays the highest and secondhighest scores.

SET 4

1. Develop a Python Application to get marks details of N students of 5 subjects. And compute the total and percentage marks of each student with Grade. The following details to be entered

a. Register Number
b. Name
c. Dept
d. Mark 1
e. Mark 2
f. Mark 3
d. Marks 4
e. Marks 5

2. Design a program to print the student Number and grad given the studentNumber and 5 test marks. The grade is based on the following rules

Average Mark	Grade
>=80	Distinction
>=65 and <80	Merit
>=50 and <65	Pass
<50	Fail

3. Write a Python Program to determine how many times a given letter occurs in a String Recursively

Case 1:
Enter string:abcdab
Enter character to check:b
Count is: 2

Case 2:
Enter string:hello world
Enter character to check:l
Count is: 3

4. Write a Python program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.
Sample List : ['abc', 'xyz', 'aba', '1221']

5. Write a Python program to find the maximum and minimum value of the three given lists.
Original lists:

[2, 3, 5, 8, 7, 2, 3]
[4, 3, 9, 0, 4, 3, 9]
[2, 1, 5, 6, 5, 5, 4]

SET 5

1. Write a python program to calculate the volume and area of a sphere using the formulas.

$$V = 4\pi r^3/3$$

$$A = 4\pi r^2$$

2. Write a python program that will convert a positive integer quantity to a roman numeral (e.g., 11 will be converted to XI, 14 will be converted to XIV, and so on).

3. Write a python program that will generate every third integer, beginning with i= 2 and continuing for all integers that are less than 100. Calculate the sum of those integers that are evenly divisible by 5.

4. Develop a python application to read a five-letter word into the computer, then encode the word on a letter-by-letter basis by subtracting 30 from the numerical value that is used to represent each letter. Thus if the ASCII character set is being used, the letter a (which is represented by the value *97)* would become a C (represented by the value *67),* etc.

Write out the encoded version of the word. Test the program with the following words: green, roses, India.

5. Write a python program to read into the computer a five-letter word that has been encoded using the scheme described above. Decode the word by reversing the above procedure, then write out the decoded word.

SET 6

1. Develop a Python Application to get the number of units consumed of 5 users. The charges are given below and compute the total amount to be paid by the user.

Unit	Charge/Unit
Upto 199	@1.20
200 and above but less than 400	@1.50
400 and above but less than 600	@1.80
600 and above	@2.00
If bill exceeds 400 then surcharge of 15% will be charged and the minimum bill should be Rs.100	

The following details to be entered a. Customer Id, b. Customer Name, c. Month, d. Units Consumed. Generate the report for the 5 users.

2. Develop a Python Application to get the details of 5 users (Customer Id,Customer Name, Month,Units Consumed, Bill paid, if yes date of payment). Generate the report for those users who have paid their bill where bill id to be automated (BCus_001).

Bill id Customer id Name Units Date of payment Amount paid

3. Develop a Python Application to get the details of 5 users (Customer Id,Customer Name, Last 3 Months of Units Consumed). Predict the no. of units that will be consumed in the next month as same, unpredict.
(Hint: average of three months is less than or equal to last month of unit consumed then same else unpredict)

Bill id Customer id Name 3 months ofUnitsPredict for nextMonth

4. You are given two string S1 and S2. Write a Python program to predict whether the strings falls under anagram

5. Develop a Python Application to get the details of 5 users (Customer Id,Customer Name, Last 3 Months of Units Consumed). Predict as domestic / commercialized usage of bill based on the units consumed
(Hint: average of three months is less than or equal to last month of unit consumed then domestic else commercial)

Bill id Customer id Name 3monthsofUnits Usage

SET 7

1. Create a class customer with name, address as its member variables. In list of account holder's information, find the account holder how live nearby (using pincodes). If a name of the person is given then, customers of the same bank lives nearby should be given as output

2. Create a class that can calculate the IT the based on the loan and saving account transactions by the customer (Take the total amount deposited through out the year in an array, check the transaction which leads to saving in the same bank or other modes. Deduct the expenditure on saving to the maximum of 1.5L. For the rest of the amount calculate 6% of IT till 10L and 8% till 15L above that make 10% as IT).

3. Implement the following scenario using Inheritance. Create a class bank make appropriate variables, assign customer class as child of bank. Create classes Saving and Loan and Current account. Make all these classes as child of bank. Maintain transaction function in all these class to track the tractions

4. In continuation with the above bank class. Now create scoreboard for the customers. Function name of score same in all three classes but scores the point according to the account type.

   Saving account : Score 1 pt for each 2k credit and deduct .25 for each 2k debit, 1 point for consistent balance of 10k
   Current account: Score 1 pt for each 2k credit 1 point for consistent balance of 10k, reduce 1 pt for overdue more than 25k
   Loan amount: Give 1 point for each on time repay and reduce 0.5 points for penalty payment.

5. Allow the customers to rate the services of the bank, give (display)customer a choice of service which they want to rate, and allow them to rate. Display the total score given by the particular customer and as the whole. (As an advancement take the score along with date display a chart with sum of scores on each period for each service).

SET 8

1.Develop a python program using decision control structure find the leap years between the year limit 2000 to 2025.
2.Develop a python program to check the given number is Armstrong number or not using iteration control structures.
3. Solve the towers of Hanoi problem using recursive function in python language (n=3 discs)
4.Develop a python code declare the function swap and perform swapping operation of two numbers without using temp variables.
5. Develop a python program which should have all function prototypes to perform any four arithmetic operations.

SET 9
APP - Structural Programming Questions.

1. Friend of three are going for the weight loss challenge. The winner will get exciting prizes from other two.

input:
Challenge day:
friend1-63
friend2-47
friend3-39
one month later:
friend1-59
friend2-44
friend3-42

output:
Winner is: friend1

2. Using python programming, Find the electrical bill to be paid from the previous and current reading. Rule slab is given below.

Units 0-100 - Rs.0
Units 101-200 - Rs.1.00
Units 201-300 - Rs. 2.00
Units 301 - more - Rs. 3.00

Input:

Previous reading: 5897
Current reading: 6121

Output:
Bill amount: 148

3. Management of a car company, planning to give incentives for their employee based on the year of experience. If the employee Service is 3 years then he will get Rs. 30,000 as incentives, if the employee Service is 2 years then he will get Rs. 20,000 as incentives and if the employee Service is 1 years then he will get Rs. 10,000 as incentives.
The employee id consist of 5 digits, first two digit indicates the joining year and next three digit indicates roll number.

Input:
Employee id: 20407

Output:
incentives: Rs. 10,000

4. School of computing students are planning to design a smart health care wearable device to detect the mood of the user.
In recent study says, if a person is very relax he will cover the walking distance of 1 kilometer by 15 min, if a person is hectic he will cover the walking distance of 1 kilometer by 9 min and if a person is normal he will cover the walking distance of 1 kilometer by 12 min. Based on the covering distance, the system is designed to detect the mood of the user.

input:
Average time taken to cover 1 km: 9min and 30 sec

output:
Mood: hectic

5. Examination was conducted for 100 students. There are totally 2 set of question papers (50 QP in each set). The time the proctor distributed the question papers, it is the usual routine that some students will choose the QP that covers their known question and the students indulge in exchanging the question paper mutually. To avoid this situation, proctor sets the simple rule like, all the even register number students will take set A QP and all the ODD register number students will take set B QP (Assuming Reg No ranges from RA2011003010001 - RA2011003010100)

input: RA2011003010009

output: set B

SET 10

1. In Japan ,there was a very huge Tsunami. Millions and millions worth buildings and properties were destroyed. Many people lost their lives. Most of them were injured and few were safe. A news reporter arrives to the spot to take the current survey regarding the situation of the people alive , dead and injured. He wanted to publish it in the newspaper and ask the other countries to help the affected people.

   Can you please help him in this noble cause by writing a program to generate the newspaper report?
   INPUT FORMAT:
   Input consists of three integers corresponding to the number of people dead , injured and those who are still alive and safe.
   OUTPUT FORMAT:
   Refer sample input and output for formatting specifications.

   [All text in bold corresponds to input and the rest corresponds to output]
   SAMPLE INPUT AND OUTPUT FORMAT:
   Enter the number of people dead:
   2000
   Enter the number of people injured:
   3000
   Enter the number of people safe:
   10000
   TSUNAMI REPORT OF JAPAN
   The number of people
   1)Dead:2000
   2)Injured:3000
   3)Safe:10000
   Please help the people who are suffering!!!

2. Sumanth having N number of elements and he decided to create a set for it.and after creating set he wants to add some elements to set and remove elements to set and find the difference between two sets, and he wants to know the intersection elements in two sets.and all the process will be shown in input and output format specifications.

   So can you please help him to write aa program to add(),remove(),intersection(),difference() to the sets.

   Input Format Specifications:
   The first line of input creates set 1 with Strings (str).
   The second line of input creates set 2 with Strings (str).

The next line will choose one option in which operation you want in sets.
Next line will be choose set for operation
The sample input showed the Sample input format.
Note that print the elements in sorted order
Output Format Specifications:
The output consists of a single line as per your choice.
Display 'invalid choice', if the entered choice is wrong.
Sample Input and Output showed below

Sample Input1:
banana,apple,sony
mango,apple,samsung
choose one option 1)add 2)remove 3)difference 4)intersection
1
choose one 1)set1 2)set2
1
orange
Sample Output 1:
set(['apple','banana',orange','sony',])

3. Newton's method (also known as the Newton–Raphson method), is a method for finding successively better approximations to the roots (or zeroes) of a real-valued function. The algorithm is first in the class of Householder's methods, succeeded by Halley's method. The method can also be extended to complex functions and to systems of equations.
   Given a number, write a program to find the square root of a number using Newton's Square Root.

4. Ravi wants to familiar with some pattern programs.So help him to Write a python code to read a number n from a user and print an inverted right triangle star pattern of the desired size.
   Sample Input and Output 1:

   Enter number of rows:
   4
   * * * *
   * * *
   * *
   *

5. Write a Python program
   - To add new elements to the end of the list
   - To reverse elements in the list
   - To display same list elements multiple times
   - To concatenate two lists
   - To sort the elements in the list in ascending order

SET 11

Structured Paradigms Exercises:

1: Write a python program using structured programming paradigms for displaying first name, last name, email, user id, password and confirm password of the user for school applications. All the inputs are to read from user at run time and proper conversion also to be included in the code. After validating the user name and password display the authorized user details in console window.

2:Create a multiplication table asking the user the number of rows and columns he wants.Write a python program to implement the above table.

3: Write a python program where the program takes a random integer between 1 to 10, the user is then prompted to input a guess number. If the user input matches with guess number, the program will display a message "Good Work" otherwise display a message "Not matched".

4: Write a python program using structured paradigms concepts to compute the sum of the two given integers. If the two values are same, then returns triple their sum.

5: Write a python program to check the total marks of a student in various examinations. The student will get A+ grade if the total marks are in the range 89..100 inclusive, if the examination is "Final-exam." the student will get A+ grade and total marks must be greater than or equal to 90. Return true if the student get A+ grade or false otherwise.

SET 12

Structured Programming

1. Suppose the cover price of a book is $24.95, but bookstores get a 40% discount. Shipping costs $3 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies?
2. Hourly workers typically earn overtime when they work more then 40 hours per week. For example, overtime pay might be 150% of the regular salary for the additional hours. Write a Python program that will ask the user for their hourly wage, then for the hours they have worked in the past week. With these two values print the wages earned for the week.
3. Python provides a built-in function called len that returns the length of a string, so the value of len('allen') is 5. Write a function named right_justify that takes a string named s as a parameter and prints the string with enough leading spaces so that the last letter of the string is in column 70 of the display.
4. Suppose any line of text can contain at most one url that starts with “http://” and ends at the next space in the line. Write a fragment of code to extract and print the full url if it is present. (Hint: read the documentation for find. It takes some extra arguments, so you can set a starting point from which it will search.)
5. Assume the variable named n holds a positive integer value. How do you determine the last digit of n? (Hint, what does the % operator do?)

SET 13

Structured Programming Using Python

1. Write code that starts with a string of words and results in a new string consisting of the same words, but where the first word swaps places with the second, and so on. For example, 'the cat sat on the mat' will be converted into 'cat the on sat mat the'.

2. Write a function that takes a list of words (containing duplicates) and returns a list of words (with no duplicates) sorted by decreasing frequency. E.g. if the input list contained 10 instances of the word table and 9 instances of the word chair, then table would appear before chair in the output list.
3. Write code that removes whitespace at the beginning and end of a string, and normalizes whitespace between words to be a single space character.
4. Write code to initialize a two-dimensional array of sets called word_vowels and process a list of words, adding each word to word_vowels[l][v] in ascending order of l, where l is the length of the word and v is the number of vowels it contains.
5. Assign a new value to sentence, namely the string 'she sells sea shells by the sea shore', then write code to perform the following tasks: a) Print all words beginning with 'sh': b) Print all words longer than 4 characters.

SET 14

Ex1: Write a program that counts and prints number from 1 to N (given as input), skipping numbers that are multiples of 5 and stopping the count if the number reached squared is equal to N.

Ex2: In cryptography, the Ceasar cipher is a type of substitution cipher in which each letter in the
plaintext is replaced by a letter some fixed number of positions down the alphabet. For example, with a shift of 3, A would be replaced by D, B would become E, …, X would become A, Y would become B, and Z would become C.
a. Write a program that reads in a sentence, and substitutes it using the Ceasar cipher with a shift of 3.
b. Write a program that reads in sentence that has been encrypted with the Ceasar cipher with a shift of 3, and decrypts it.
c. Repeat a and b above for a Ceasar cipher with a shift N, where N is given as input, N between 0 and 10

3. Change the string

Given a string S, the task is to change the complete string to Uppercase or Lowercase depending upon the case for the first character.

Example 1:

Input:

S = "abCD"

Output:abcd

Explanation: The first letter (a) is

lowercase. Hence, the complete string

is made lowercase.

Your Task:
You don't need to read input or print anything. Your task is to complete the function **modify()** which takes the string **S** as input and **returns** the resultant string with stated modifications.

4. Sum Of Digits

Given a number, **N**. Find the sum of all the digits of N

Example 1:

Input:

N = 12

Output:

3

Explanation:

Sum of 12's digits:

1 + 2 = 3

Your Task:
You don't need to read input or print anything. Your task is to complete the function **sumOfDigits()** which takes an integer **N** as input parameters and returns an integer, total sum of digits of N.

5. **Maximum number of zeroes**

Given an array **arr[]** of **N** values, the task is to find the number which has the maximum number of zeroes. If there are no zeroes then print **-1**.

Note: If there are multiple numbers with the same (max) number of zeroes then print the Maximum number among them.

Example 1:

Input: N = 5

arr[] = {10, 20, 3000, 9999, 200}

Output: 3000

Explanation: 3000 contains 3 zero's

in it.

Your Task:
This is a function problem. You don't need to take any input, as it is already accomplished by the driver code. You just need to complete the function **MaxZero**() that takes array **arr[]** and integer **N** as parameters and returns the number with the maximum number of zeroes.

SET 15
Structured Programming

1. Develop a Python Application to get marks of 5 students of 3 subjects. And compute the total and percentage marks of each student. The following details to be entered

a. Register Number
b. Name
c. Dept
d. Mark 1
e. Mark 2
f. Mark 3

2. Develop a Python Application to get the details of 5 students. And assign register number in the format **RA_Year_00001 (Auto Generated).** And display hostler details.

3. Develop a Python Application to get the details of 5 students along with 6 subject marks. And display the no of students failed in 1 subject, 2 subjects and more than 2 subjects.

4. You are given a string S and a set of n substrings. You are supposed to remove every instance of those n substrings from S so that S is of the minimum length and output this minimum length.
Eg:
S- ccdaabcdbb
n=2 - substrings-- ab, cd

Output: 2
Explanation:
ccdaabcdbb ->ccdacdbb ->cabb ->cb (length=2)

5. Develop a Python Application to get the details of 5 students along with name and register number. Predict the year in which the student studying from register number

Eg: RA1911031010001 - the is currently in II year

RA1711031010001 - Final Year

RA1511031010001 – Passed out