MCKV Institute of Engineering
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Subject: IT Workshop (Using Python) Lab   **Code: PC - CS 392**

Stream: CSE 1 & CSE 2   **Credit: 1.5**

Assignment: - 01/ *Introduction to python Program and concept of Data Types*

A. Write a program to print MCKVIE and Computer Science & Engineering. Apply \n in your program.
B. Consider the radius of a Circle and write a python program to calculate area and perimeter and display the results.

Assignment: - 02/ *Concept of Variables and Operators*

A. Write a python program to swap two variables using and without using third variable.
B. Consider the basic pay of an employee as user input. AGP is 50% of the basic pay. Company provides 50% DA and 15% HRA on the merged basic. Write a python program to calculate and display total salary of the employee.

Assignment: - 03/ *Concept of Operators and Conditional Statement*

A. Write a python program to find the greatest among three numbers.
B. Write a python program to check whether a year is Leap Year.
C. In general, an equation of the form $ax^2 + bx + c = 0$ is known as quadratic equation. Accept the values of a, b, and c from the user and write a python program to calculate the roots of the given quadratic equation.

Assignment: - 04/ *Concept of Loop Structure and Use of* **break** *keyword*

A. Write a python to generate Fibonacci Series up-to n-terms using loop.

B. Write a python program to generate all Prime Numbers within a range, where range is user input.

C. An automorphic number is the number which contained in last digit(s) of its square. Example 25 is an automorphic number as its square is 625 and 25 is present as the last two digits. Write a python script to print all two digits automorphic numbers.

D. Write three separate python programs to generate the following patterns:

i.	ii.	Extra

`          *`
`        *  *  *`
`    *  *  *  *  *`
`        *  *  *`
`          *`
	`                A`
	`              B  A`
	`            C  B  A`
	`          D  C  B  A`
	`        E  D  C  B  A`
		`A  B  C  D  E  D  C  B  A`
		`A  B  C  D        D  C  B  A`
		`A  B  C                 C  B  A`
		`A  B                         B  A`
		`A                                 A`

Assignment: - 05/ *Concept of String*

A. Consider a user given string **s**. write a program to convert uppercase letters into lowercase and lowercase letters into uppercase. Also print the resultant string.
   Input: The Joy Of Computing
   Output: tHE jOY oF cOMPUTING

B. Given a student's email id in the following format 11603219005@mckvie.edu.in, write a program to find the roll number and institute name of the student.

    Input: 11603219005@mckvie.edu.in
    Output: 11603219005 MCKVIE

C. Write a program that accepts a sentence and calculate the number of upper-case letters and lower-case letters.
  Input Format: The first line of the input contains a statement.
  Output Format: Print the number of upper case and lower case respectively.
  Input: Hello world!
  Output: 1 9

D. Write a Python program that takes a sentence and two indices as input and show the substring between the specified indices also check the substring is a palindrome or not.
  Input: A synthetic aperture radar is able to detect the presence of water and ice. 22 26
  Output: radar palindrome

Assignment: - 06 / *Concept of List, Set, Dictionaries*
A. Given a list of numbers (integers), find second maximum and second minimum in this list.
  Input: 10 11 100 200 300 34
  Output: 200 11
B. Given a list L write a program to make a new list and match the numbers inside list L to its respective index in the new list. Put 0 at remaining indexes. Also print the elements of the new list in the single line.
  Input: [1,5,2]
  Output: [0, 1, 2, 0, 0, 5]
C. Take two statements from user as input and show
    a. Unique common words
    b. All unique words
    c. All unique words present in 1st statement but not in second
  Input: **Here is Python**
              We are learning Python
  Output: **a. {'Python'}**
              b. {'We', 'are', 'learning', 'is', 'Python', 'Here'}
              c. {'is', 'Here'}
D. Take a string as input. Form a dictionary which will have each unique word present in the string as key and frequency of the word as value.
  Input: Python is inspired by Monty Python
  Output: {"Python": 2, "is": 1, "inspired": 1, "by": 1, "Monty": 1}
E. Given a list of strings, write a program to write sort the list of strings on the basis of last character of each string.
  Input: ['ram', 'shyam', 'lakshami']
  Output: ['lakshami', 'ram', 'shyam']

Assignment: - 07 / Concept of Functions
A. Write a recursive function fibo(), which will take an integer as input(n) and show the Fibonacci Series up to n-terms. Make sure that the default value of n is 1.
B. Write a recursive function fibo_n(), which will take an integer as input(n) and returns the n-th term of Fibonacci Series. Make sure that the default value of n is 1.
C. Write a function gcdlcm(), which will take two integers (a, b) as input and return the GCD and LCM of these two. Make sure that the default value b is 1.
D. Use the concept of high-ordered filter function to generate a list of all prime numbers in the range 251 to 10500, in reverse order.
E. Use the concept of lambda function list all the Leap years in the range 2022 to 3000.

Assignment: - 08 / Concept of Modules and Packages

A. Create module called 'numberCheck', with two functions called 'primeCheck()' (to check a number is prime or not) and 'palindromCheck()' (to check a number is palindrome or not). Import the following module in your source code. Take an integer input in your current source code and call the 'numberCheck' module's functions to check the number is prime and/or Palindrome number or not.

B. Import numpy module in your source code. Create function named matrixMultiplication(), where create m X n matrix (A) integer by taking user inputs. Also, create a n X m matrix (B) with random numbers between 1 to 20 . Generate a C matrix where C = A X B. Show the C Matrix.

Assignment: - 09 / Concept of Exception Handling: Exception, Exception Handling, except clause, Try- finally clause, User -Defined Exceptions

A. A string with parentheses is well formed if all parentheses are matched: every opening bracket has a matching closing bracket and vice versa. Write a Python program to an expression and call a function wellBrackated() which will return True if the input is well bracketed else False. Handle all the exception where required.

Extra. Write ratotaList(), Python function which will take 2 parameters as input . 1st parameter is a list which to be rotated, 2nd parameter will be the number times it will be rotated (if <0 Left Rotation else Right Rotation). The function will return a new rotated list. The function will raise an exception if the given list is empty, the value of rotations must be less than the number of elements in the list, else it will raise a user define exception and return the original list. By default, number of rotations will be 0.

Here are some examples to show how your function should work.
>>> rotateList([1,2,3,4,5], 1)
[5, 1, 2, 3, 4] #Right Rotation
 >>> rotateList([1,2,3,4,5], -3)
[4, 5, 1, 2, 3] #Left Rotation

Assignment: - 10 / The Object-Oriented Approach: Classes, Methods, Objects

A. Create a class A. Define the constructor which will show "Class A object created". Define a method show (), which will show "Showing Class A".

B. Create a class B. Define the constructor with two arguments which will show "Class B object created with value 1 and value 2". Define a method show (), which will show "Showing Class B with value 1 and value 2".

C. Create a class C inheriting class B. Define the constructor with three arguments which will show "Class B object created with value 1 and value 2" and show "Class C object created with value 1, value 2 and value 3". Define a method show (), which will show "Showing Class C with value 1, value 2 and value 3".

D. Create a class D inheriting class C. Define the constructor with four arguments which will show "Class B object created with value 1 and value 2" and show "Class C object created with value 1, value 2 and value 3" and show "Class D object created with value 1, value 2, value 3 and value 4". Define a method show (), which will show "Showing Class B with value 1 and value 2" and "Showing Class C with value 1, value 2 and value 3" and "Showing Class D with value 1, value 2, value 3 and value 4".

E. Create a class E by inheriting class A and B. Define the constructor so that if no argument is passed while creating an object it will display "Class E object created", if two (2) arguments are passed it will display "Class E object created with value 1 and value 2". Also define a method show (), which will show "Showing Class E" or "Showing Class E with value 1 and value 2" if no or two arguments are passed to it.

F. Create a class F. Define a constructor which will take one string. Consider x and y are two objects of class F, then if we perform x – y then it will give the characters (in order) present in x but not in y.

Assignment: - 11/ Concept of Files

A. Write a program in python to create a text file and write the text "Welcome to Python" in the file.

B. Write a program in python to store the first n prime numbers in text file.

C. Write program in Python to store Fibonacci numbers between 0 to n, in a text file.

D. Write a program in Python to read line(s) of a text file and display the lines.

E. Write a program in Python to find the size of a file.

Assignment: - 12/ Data Visualization using Python

A. Write a Python program to read the sales data from a CSV file (sample.csv) and plot the region-wise total sales in bar graph and pie chart in single figure.