22CA1L1: PROGRAMMING AND PROBLEM SOLVING USING PYTHON LAB

Course Name	Programming and Problem Solving using Python Lab		L	T	P	C	CIA	SEE	TM
Course Code	22CA1L1		0	0	6	3	30	70	100
Year of Introduction: 2019	Year of Offering: 2022	Year of Revision: 2022	Percentage of Revision: 30						
L-Lecture, T-Tutorial, P-Practical, C-Credits, CIA-Internal Marks, SEE-External Marks, TM-Total Marks									

Course Description and Purpose:
Python Programming is a course that illustrates Basic Concepts of Python programming, Decision Control Statements, Functions and Modules, Python Strings Revisited, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, File Handling, Numpy, Matplotlib.

Course Objectives:
This course will help enable the students to understand, learn and develop a various Decision Control Statements, Functions & Modules, Strings, Data Structures, Classes and Objects, Inheritance, Operator Overloading, Pandas, Error and Exception Handling, Handling Files, Databases.

Specific objectives include:
- ✓ To understand *Basics of Python Programming*, *Decision Control Statements*.
- ✓ To know the concepts *of Data Structures*, *Functions and Modules*.
- ✓ To know the concepts of *Classes and Objects*, *Object Oriented Programming*.
- ✓ To apply *Error and Exception Handling*.
- ✓ To implement *Database Access* and *File Handling*.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand *Basics of Python Programming*, *Decision Control Statements*.
CO2: Know the concepts of *Data Structures*, *Functions and Modules*.
CO3: Know the concepts of *Classes and Objects*, *Object Oriented Programming*.
CO4: Apply *Error and Exception Handling*.
CO5: Implement *Database Access* and *File Handling*.

1. Write a program to find total for given number of tens, number of fives, number of twos and number of ones. (CO1, L1)
2. Write a program to enter a number and display its hex and octal equivalent and its square root. (CO1, L1)
3. Write a program to read and print values of variables of different data types. (CO1, L1)
4. Write a program to calculate the distance between two points. (CO1, L1)
5. Write a program to calcuate area of troangle using Heron's formula. (CO1, L1)
   (Hint: Heron's formula is given as: area=sqrt(S*(S-a)*(S-b)*(S-c)))
6. Write a program to calculate the distance between two points. (CO1, L1)
7. Write a program to perform addition, subtraction, multiplication, division, integer division. (CO1, L1)
8. Write a program to find the greatest number from three numbers. (CO1, L1)
9. Write a program to calculate tax given the following conditions: (CO1, L1)
   If income is less than 1,50, 000 then no tax
   If taxable income is Rs.1,50,001 - Rs.300,000 then charge 10% tax
   If taxable income is Rs.3,00,001 - Rs.500,000 then charge 20% tax
   If taxable income is above Rs.5,00,001 then charge 30% tax

10. Write a program to calculate roots of quadratic equcation. (CO1, L1)
11. Write a program to enter the marks of a student in four subjects. Then calculate the total and aggregate, and display the grade obtained by the student. If the student scores an aggregate garter than 75%, then the grade is Distinction. If aggregate is 60>= and <75, then grade is First Division. If the aggregate is 50>= and <60, then the grade is Second Division. If aggregate is 40>= and <50, then the garde is Third Division. Else the grade is Fail. (CO1, L1)
12. Write a program to read the numbers until -1 is encountered. Find the average of positive numbers and negative numbers entered by the user. (CO1, L1)
13. Write a program to find whether the given number is an *Amstrong Number* or *not*. (CO1, L1)
14. Write a program to enter a Decimal Number. Calculate and display its Binary Equivalent. (CO1, L1)
15. Write a program to demonstrate List Operations. (CO2, L1)

- Access List Items
- Change Item Value
- Appended Items
- Remove Specified Item
- Loop Through a List
- List Comprehension
- Sort List Alphanumerically
- Copy a List
- Join Two Lists
- List Methods

16. Write a program to demonstrate Tuple Operations. (CO2, L1)

- Access Tuple Items
- Negative Indexing
- Range of Indexes
- Range of Negative Indexes
- Check if Item Exists
- Update Tuples
- Add Items
- Remove Items
- Unpacking a Tuple
- Using Asterisk*
- Loop Through a Tuple
- Loop Through the Index Numbers
- Using a While Loop:
- Python - Join Tuples
- Join Two Tuples
- Multiply Tuples

17. Write a program to demonstrate Set Operations. (CO2, L1)

- Access Set Items
- Add Set Items
- Loop Sets
- Join Two Sets
- Keep ONLY the Duplicates
- Keep All, But NOT the Duplicates

18. Write a program to demonstrate Dictionary Operations. (CO2,L1)

- Ordered or Unordered?
- Changeable
- Duplicates Not Allowed
- Accessing Items
- Change Values
- Update Dictionary
- Adding Items
- Remove Dictionary Items
- Loop Through a Dictionary
- Copy a Dictionary
- Nested Dictionaries

19. Write a program to enter a number and then calculate the *Sum of Its Digits*. (CO2,L1)
20. Write a program to print the *Reverse Number*. (CO2,L1)
21. Write a program to calculate GCD of two numbers. (CO2,L1)
22. Write a program that prompts users to enter numbers. The process will repeat until user enters -1. Finally, the program prints the count of prime and composite numbers entered. (CO2,L1)
23. Write a program (CO2,L1)

(a) To calculate the factorial of number recursively.

(b) To calculate GCD using the recursive functions.

24. Write a program (CO2,L1)

(a)To calculate exp(x,y) using recursive functions

(b) To print the Fibonacci Series using Recursion.

25. Write a program make a *Simple Calculator*. (CO2,L1)
26. Write a program that defines a function large in a module which will be used to find large of two values and called from a code in another module. (CO2,L1)
27. Write a program that demonstrate the use of method __init__ . (CO3,L1)
28. Write a program to illustrate the modification of instance variable. (CO3,L1)
29. Write a program for modifying a mutable type attribute. (CO3,L1)
30. Write a program to demonstrate the use of inheritance. (CO3,L1)
31. Write a Program to demonstrate Polymorphism. (CO3,L1)
32. Write a program to demonstrate Polymorphism using Function Overloading. (CO3,L2)
33. Write Program to demonstrate Method Overriding with arguments. (CO3,L2)

34. Write a python program to demonstrate multilevel inheritance. (CO3,L2)
35. Write a program to demonstrate Multipath Inheritance (or) Hybrid Inheritance. (CO3,L2)
36. Write a program to demonstrate Multi Level Inheritance (A person is teacher & having designation HOD) (CO3,L2)
37. Write a program to demonstrate *Multi-Path Inheritance*. (CO3,L2)
38. Write a program to illustrate the concept of Abstract Class. (CO3,L2)
39. Write a program to overload the + operator on a complex object. (CO3,L2)
40. Write a program to handle Divide by Zero Exception. (CO4,L2)
41. Write a program to handle Multiple Errors with One Except statement. (CO4,L2)
42. Write a program with Multiple Except Blocks. (CO4,L2)
43. Write a program to demonstrate else statement in exception handling. (CO4,L2)
44. Write a python program to illustrate the try...catch...finally in exception handling. (CO4,L2)
45. Write a program to demonstrate Regular Expression Functions. (CO2,L2)

- findall()
- Search
- Split
- sub()

46. Write a program Demonstrate Regular Expression Meta Characters. (CO2,L2)

- Python program to match string using metacharacter []
- Program to find digits in character using metacharacter \
- Program for sequence that starts with "he", followed by two (any) characters using metacharacter ..
- Program to check if the string starts with 'hello' using metacharacter ^
- Program to check the string ends with 'world' using metacharacter $
- Program to check the string contains "ai" followed by 0 or more "x" characters
- Program to check the string contains "ai" followed by 1 or more "x" characters
- Program to check if the string contains "a" followed by exactly two "l" characters
- Program to check if the string contains either "falls" or "stays" using meta character |

47. Write a program to demonstrate Regular Expression Sequences. (CO2,L2)

- Program to check if the string starts with "The"
- Program to check if "ain" is present at the begining of a word
- Program to check if "ain" is present at the end of a word.
- Program to check if "ain" is present, but NOT at the begining of a word.
- Program to check if "ain" is present, but NOT at the end of a word.
- Program to Check if the string contains any digits (numbers from 0-9).
- Program to return a match at every no-digit character.
- Program to return a match at every white-space character.
- Program to return a match at every NON white-space character.
- Program to return a match at every word character (characters from a to Z, digits from 0-9, and the underscore _ character)

- Program to return a match at every NON word character (characters NOT between a and Z. Like "!", "?" white-space etc.)
- Program to check if the string ends with "Spain".

48. Write a program to demonstrate Regular Expression Sets.

- Program Check if the string has any a, r, or n characters.
- Program to Check if the string has any characters between a and n.
- Program to Check if the string has other characters than a, r, or n.
- Program to check if the string has any 0, 1, 2, or 3 digits.
- Program to check if a string has any digits.
- Program to check if the string has any two-digit numbers, from 00 to 59.
- Program to Check if the string has any characters from a to z lower case, and A to Z upper case.
- Program to check if the string has any + characters.

49. Write a program to (CO5,L2)

- Create EMP table with attributes ENO,ENAME and ESAL into PBS database.
- Insert rows into EMP table of PBS database.
- Update rows of EMP table of PBS database.
- Delete rows from EMP table of PBS database.
- Drop EMP table of PBS database.

50. Write a program to open the file and count the number of times a character appears in the file. (CO5,L1)