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| **WEEK NO.** | **PROBLEMS WITH DESCRIPTION.** | | **SIGNATURE OF THE TEACHER WITH DATE** |
| **1** | **1** | Discuss tools used and basic features of Python programming language. **STEPS TO DOWNLOAD AND INSTALL PYTHON 3.8 FOR WINDOWS**  **STEP 1: DOWNLOAD PYTHON 3.8**  To start, go to python.org/downloads and then click on the button to download the latest version of Python |  |
| **2** | **STEP 2: RUN THE .EXE FILE**  Next, run the .exe file that you just downloaded |
| **3** | **STEP 3: INSTALL PYTHON 3.8**  You can now start the installation of Python by clicking on Install Now: Note that depending on your needs, you may also check the box to add Python to the Path. After a short period of time, your setup will be completed: Congrats, you just installed Python for Windows! Let’s now see how to run a simple code in Python. |
| **4** | **STEP-4: OPEN IDLE INTEGRATED DEVELOPMENT ENVIRONMENT FOR PYTHON**  A quick way to find your Python IDLE on Windows is by clicking on the Start menu. You should then see the IDLE under “Recently added” Once you click on the Python IDLE, you will then see the Shell screen |
| **5** | **STEP-5: RUN FOLLOWING COMMAND IN IDLE INTERPRETER** print (‘Hello, world’) print ('Python is object-oriented high-level programming language') |
| **6** | **STEP-6: CREATE A PYTHON SCRIPT**  Click on File and then select New File (alternatively, you may use the keyboard shortcut of CTRL):  You will now see the following “untitled” box, where you can type your Python code.  Write the following commands in the python script file print (‘Hello, world”’)  print ('Python is object-oriented high-level programming language') This is how the command would look like in the “untitled” box.  Save this with .py extension Choose a location where the Python file will be saved on your computer. You’ll also need to type a name for your file. For example, I named the file as “Test”  After saving file, press F5 or Run Module in Run  The output will be printed on your python shell. |

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| **2.** | **1** | Install IDLE interpreter for Python programming. |  |
| **2** | Use interactive Shell to print the Hello Example: print ‘Hello, World’ |
| **3** | Start the Python interpreter and use it as a calculator i.e., Use interactive shell to perform the following operations  + 3, 5\*3, 7-2, 6/2, 6/4, 6%4, 6%2, 2\*4-3, 4-2\*6-4 |
| **4** | Define Variable First name and last name which consists of your first and last names respectively. |
| **5** | Write a program to print your full name using single print statement. |
| **6** | Write a program in Python programming and save it firstProgram.py to perform the following operations:  + 3, 5\*3, 7-2, 6/2, 6/4, 6%4, 6%2 |
| **7** | Write a program in Python programming and save it second Program.py to display the following messages:  “Hello World, Python is High level, General-purpose Programming language”  “Guido Van Rossum invented the Python programming language in 1990s” |
| **8** | Write a program to compute the value of following algebraic expression-  ax5 + bx4+ cx3 + dx2 + ex + f  The values of coefficients are as follows a, b, c, d, e, f = 5, -4, 2, 4, 3, 9  The value of x will be read using input () function. |
| **9** | Write a program to compute the value of following algebraic expression- (1+x/y+xy)/(2+y/x+yx) The value of x and y will be read using input () function. |
| **10** | Write a program to read an integer and use bitwise operators to multiply it by 2 (<< operator). |
| **3.** | **1** | Write Python programs to find SUM and MULTIPLY of any three integers. |  |
| **2** | Write a program to find the average of any five numbers. |
| **3** | Write a program to convert Celsius into Fahrenheit temperature. |
| **4** | Write a program to find perimeter of Rectangle. |
| **5** | Write a Python program which accepts the radius of a circle from the user and compute the area. |
| **6** | Write a program to read an integer and use bitwise operators to divide it by 4  (>> operator). |
| **7** | Write a program to read the values of two integer variables and use bitwise operators to exchange the values of the variables (^ operator). |
| **8** | Write a program to multiply a number by 7 (Use bitwise operators). |
| **9** | Write a program to read the values of two integer variables and exchange the values (Use addition and subtraction operators).  A = 5\*15 = 5\*(16-1) = 5\*16 – 5\*1 = (5<<<0) |
| **10** | Write a program to compute the factorial of an integer (use loop). |
| **11** | How to find out if a given number is a Fibonacci number or not. |
| **12** | Write a program to check whether the integer is prime or find its first factor. |
| **13** | Write a program to find the GCD of two numbers. |

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| **4.** | **1** | Write Python functions for followings-   * Compute average of any five numbers. * Convert Celsius into Fahrenheit temperature. * Find perimeter of Rectangle. |  |
| **2** | The volume of a sphere with radius r is 43 πr3. Write a Python function which accepts the radius of a sphere and computes the volume. What is the volume of a sphere with radius 5? |
| **3** | Write a Python function which accepts the radius of a circle from the user and compute the area. |
| **4** | Write a Python function to calculate the factorial of a number (a non- negative integer). |
| **5** | Write a Python function to calculate the sum of digits of given decimal integer. |
| **6** | Write a Python function to check whether a number is perfect or not. |
| **7** | In number theory, a perfect number is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself. Example: 6, 28 etc. |
| **8** | Write a Python function to check whether a given number is a prime number or not. |
| **9** | Write a Python function that accepts a string and calculate the number of upper case letters and lower-case letters. (Use isupper (), islower() upper(), lower() functions). |
| **5.** | **1** | Write a Python program which accepts the inputs from the user and do the following using functions.   * To find largest of 3 numbers using positional arguments. * To find volume of cylinder or cube or rectangular box. * To find area of rectangle. * To find circumference of circle. * To exchange the values of two variables * To find the distance between two points using built-in math method. |  |
| **2** | Write a function to add arbitrary integers. |
| **3** | Write a Python program to remove the characters which have odd index values of a given string. |
| **4** | Write a Python program to count the occurrences of each word in a given sentence. |
| **5** | Write a Python script that takes input from the user and displays that input back in upper and lower cases. |
| **6** | Write a Python program to remove existing indentation from all of the lines in a given text. |
| **7** | Write a Python program to reverse a string. |
| **8** | Write a Python program to reverse words in a string. |
| **9** | Write a Python program to convert a string in a list. |
| **10** | Write a Python program to count and display the vowels of a given text. |

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| **6.** | **1** | Write a program to find the greatest of three numbers. (Use only if Statement) |  |
| **2** | Write a program to find smallest of three number. (Use if and else statement) |
| **3** | Write a program to check the given no that is even or odd. (Use if and else) |
| **4** | Write a program to check a year for leap year. (Use if and else) |
| **5** | Write a program to print number of days in a month. (Chained Conditional) |
| **6** | Write a program to find the area of triangle and show its type. (Use if and else) |
| **7** | Given two numbers r1 and r2 (r1 < r2); Write a Python program to create a list with the given range (inclusive). (Use range () function) |
| **8** | Given a list containing characters and numbers, the task is to add only numbers from a list (Use is instance () function). |
| **9** | Given a list of numbers, write a Python program to check if the list contains consecutive integers. |
| **7.** | **1** | Write a program in Python to check a number for Armstrong. (while) |  |
| **2** | Write a program in Python to print factorial of a number. (for) |
| **3** | Write a program in Python to generate first n Fibonacci terms recursively. (function) |
| **4** | Write a program in Python to compute factorial of an integer n recursively. (function) |
| **5** | Write a program in Python that asks the user how many Fibonacci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. (Without recursion) |
| **6** | Write a program in Python to print the following Pattern. (for)  \*  \* \*  \* \* \*  \* \* \* \* |
| **7** | Python Program to Find the Second Largest Number in a List. |
| **8** | Python Program to Put Even and Odd elements in a List into Two Different Lists. |
| **9** | Python Program to Merge Two Lists and Sort it. |
| **10** | Python Program to Find the Second Largest Number in a List Using Bubble Sort. |

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| **8.** | **1** | Python Program to Sort a List According to the Length of the Elements. |  |
| **2** | Python Program to Find the Union of two Lists |
| **3** | Python Program to Find the Intersection of Two Lists |
| **4** | Python Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number. |
| **5** | Assume that the variable data refers to the string “Python rules!”.  Use a string method to perform the following tasks:   * Obtain a list of the words in the string. * Convert the string to uppercase. * Locate the position of the string “rules”. * Search a given character. * Replace the exclamation point with a question mark. |
| **6** | Write a Python program to count the number of characters (character frequency) in a string. |
| **7** | Write a Python program to reverse the order of the characters in the given string. |
| **8** | Write a Python program to get a string made of the first 2 and the last 2 chars from a given a string. If the string length is less than 2, return instead of the empty string. |
| **9** | Write a program (using functions!) that asks the user for a long string containing multiple words. Print back to the user the same string, except with the words in backwards order. For example, say I type the string: My name is Michele. Then the output will be: Michele is naming My. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.) |
| **10** | Implement Binary Search in Python using divide and conquer approach. |
| **11** | Write a Python program to implement the insertion sort algorithm and visualize the intermediate steps. |
| **9**  **& 10.** | **1** | Write a Python program to create an array of 5 integers and display the n List items. Access individual element through indexes. |  |
| **2** | Write a Python program to reverse the order of the items in the array. |
| **3** | Write a Python program to find the sum of n numbers. (List) |
| **4** | Write a Python program to find the average of numbers. (List) |
| **5** | Write a Python program to find maximum/minimum value of n numbers. (List) |
| **6** | Write a Python program to search a given element in the list. |
| **7** | Write a Python program to sort the given list of elements. |
| **8** | Write a Python script to sort (ascending and descending) a dictionary by value. |
| **9** | Write a Python script to concatenate three dictionaries to create a new one. |
| **10** | Write a Python script to merge two Python dictionaries. |
| **11** | Develop a Python script to implement the bubble sort algorithm. |
| **12** | Implement the merge sort algorithm in Python and demonstrate its divide-and-conquer methodology. |
| **13** | Write a Python program to implement the quick sort algorithm and explain its best, average, and worst-case complexities. |

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| **11**  **&**  **12.** | **1** | Assume that the variable data refers to the dictionary {“b”:20, “a”:35}.  Write the values of the following expressions:  data[“a”] data. Get (“c”, None)  Len(data) data. Keys () data. Values () data. Pop(“b”)  Assume that the variable data refers to the dictionary {“b”:20, “a”:35} |  |
| **2** | Write the expressions that perform the following tasks:  Replace the value at the key “b” in data with that value’s negation.  Add the key/value pair “c”:40 to data.  Remove the value at key “b” in data, safely. Print the keys in data in alphabetical order. |
| **3** | Write a python program to read a string and count how many times each letter appears. (Histogram) |
| **4** | Write a python program to create a dictionary, read a value from the user and search the key element (Reverse lookup). |
| **5** | Write a python program to create two dictionaries and merge them. |
| **6** | Write a Python script to create a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys. |
| **7** | Implement the Matrix Chain Multiplication problem using dynamic programming in Python. |
| **8** | Develop a Python program to find the shortest path in a graph using Dijkstra’s algorithm. |
| **13.** | **1** | Implement Kruskal’s algorithm to find the Minimum Spanning Tree (MST) of a weighted graph. |  |
| **2** | Implement Traveling Salesman Problem (TSP) in Python. |
| **3** | Write a Python script to approximate a solution to the Vertex Cover problem using a greedy algorithm. |