

2023

COMPUTER SCIENCE — HONOURS — PRACTICAL

Paper : DSE-B-2P

(Programming in Python Lab)

Full Marks : 30

Set - I

Marks Distribution

Source Code	:	15
Output	:	05
Sesional	:	04
Viva voce	:	06
		<hr/>
		30

Answer *any one* question.

1. Write a program in Python to create a Graph class to store and manipulate graphs. Perform the functions given below :
 - (a) Read an edge list file, where each edge (u, v) appears exactly once in file.
 - (b) Print the degree information of each node.Consider the above graph as undirected, unweighted graph.

2. Write a program in Python that fills an empty list with n integers, where n is also a user input. Then find the longest chain of monotonically ascending or descending set of values in the list. Here choice of ascending or descending order must be inputted by user. Output "NIL" if no such order found in list.

Say : i/p list [1, 3, 0, 2, 3, 4, 5]

choice ascending, o/p [0, 2, 3, 4, 5]

3. Write a Python program to accept two file names as command line arguments where one of them is a source file and has some couple of lines of text data and rest is a blank text file. Then copy the content of source file into another adding number of vowels of the line at the end of each line. Report if source file is blank or not found.

 4. Write a Python class to perform addition and multiplication of two complex number objects.

 5. Write a Python dictionary that stores full name and CGPA informations of 10 final year students. Then do the following :
 - (a) Print the names as initials with surname, say Arindam Biswas becomes A. Biswas.
 - (b) Display details of the student with highest CGPA.
 - (c) Display names of students with CGPA below 3.0 out of 10.0, if any.

 6. Write a Python function that reads a text file and do the following operations :
 - (a) Read any character from user input that is supposed to be found at least once in that input file.
 - (b) If inputted character is not found in file, then report the issue and ask to re-enter other character.
 - (c) Remove every occurrences of the inputted character, store and display the rest of file content.

 7. Write a Python class to implement Queue data structures with the required functions as : enqueue(), dequeue() and is Empty() that checks if the queue is empty.
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(Programming in Python Lab)

Full Marks : 30

Set - II

Marks Distribution

Source Code : 15

Output : 05

Sesional : 04

Viva voce : 06

30

Answer *any one* question.

1. Write a Python program to create a list (taking values from the user) and count the occurrence of each element and then create a dictionary to show the count of each element.

For example :

Input :

sample_list = [11, 45, 8, 11, 23, 45, 23, 45, 89]

Output :

{11 : 2, 45 : 3, 8 : 1, 23 : 2, 89 : 1}

2. Write a Python program to create a class representing a queue data structure. Then create methods for the following operations :

(a) enqueue()

(b) dequeue()

(c) Is_empty()

3. Write a Python program to take a multi word string from user. Then perform the following operations :

(a) Count the occurrences of a given word in the given string sentence.

For example :

Enter string : orange is orange in colour

Enter word : orange

Count of the word is : 2

(b) Form a string where the first character and the last character have been exchanged.

For example :

Enter string : hello world

Modified string : dello worth

4. Write a program in Python to implement a function that reverse elements of a nested-list recursively.

As for an example-

([[1, 2], [3, [4, 5]], 6]).

Corresponding output should be - [6, [[5, 4], 3], [2, 1]].

5. Write a program in Python that checks whether any word in a given string starts and ends with a vowel. Return true if a word matches the condition; otherwise, return false.

Sample Data :

("Red Orange White") → True

("Red White Black") → False

("abcd dkise eosksu") → True

6. (a) Write a Python program to find the power of a number using recursion.

For example :

Enter base : 2

Enter exponential value : 5

Result : 32

- (b) Write a Python program to calculate the cosine series :

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

For example :

Enter the value of x in degrees : 0

Enter the number of terms : 10

1.0

7. Consider string $S1 = \text{"I Love ICE CREAM"}$. Write a Python program to get the following output for string $S1$.

(a) Print all the words having occurrences of 'e'

(b) Output will be "I love ice cream"

(c) Reverse the string

(d) Check if $S1$ starts with 'I'

(e) Replace 'ICE CREAM' in $S1$ with 'HOCKEY'.

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(Programming in Python Lab)

Full Marks : 30

Set - III

Marks Distribution

Source Code : 15

Output : 05

Sesional : 04

Viva voce : 06

30

Answer *any one* question.

1. Write a Python program to test whether a string S comprising of lowercase characters is a Heterogram or not. The string should be passed as a command line argument.

Note : A heterogram is a word, phrase, or sentence in which no letter of the alphabet occurs more than once.

Examples :

S = "the big dwarf jumps" is a heterogram

S = "the sun rises in the east" is not a heterogram

2. Write a Python program that answers percentage of leap years over non-leap years between user inputted range of years.

Say : l-range = 2018

u-range = 2022

answer = $\frac{1}{5} \times 100\% = 20\%$

3. Write a Python program to accept two filenames as user input. Then read each line of the first file, sort the lines alphabetically and copy the sorted content to the other file. Report if source file is blank.

Say I/P file content :

Welcome
to you in
this planet called earth

O/P file content :

Welcome
in to you
called earth planet this

4. Write a menu driven program in Python to perform matrix addition and matrix multiplication. Input each matrix as python list of lists. Do necessary checkings.

5. Write a Python program that takes a list of words from command line argument and return the smallest and the longest words and lengths of each of them.

6. Write a Python class to implement stack data structure with the necessary functions : push(e), pop() and top-of-stack() which observes/returns the top element without removing from stack.

7. Write a Python program to search for numbers (0-9) of length between 1 and 3 in a given string. Numbers are separated by ',' (commas) in the string.
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(Programming in Python Lab)

Full Marks : 30

Set - IV

Marks Distribution

Source Code	:	15
Output	:	05
Sesional	:	04
Viva voce	:	06
		<hr/>
		30

Answer *any one* question.

1. Write a Python program to create sets as follows : A = Set of even numbers less than 12, and B = Set of perfect squares less than 30. Perform the following operations on two sets :
 - (a) Union of sets
 - (b) Intersection of sets
 - (c) Difference of sets.

2. Write a Python program to perform the following operations on matrices (implemented as a list of lists):

- (a) Addition
- (b) Subtraction
- (c) Multiplication.

Use separate functions for each operation.

(2)

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3. Write a Python program to create two lists L1 = ['a', 'b', 'c', 'd', 'f'] and L2 = [1000, 200, 300, 400, 500]. Then convert them into a dictionary in a way that item from L1 is the key and item from L2 is the value i.e. L = {'a': 1000, 'b': 200, 'c': 300, 'd': 400, 'f': 500}. Now perform the following operations :

- (a) Check if value 200 exists in the above dictionary.
- (b) Rename a key 'f' to 'e' in the given dictionary.
- (c) Get the key of a minimum value from the given dictionary.

4. Write a Python program to slice a list (taken as input from the user) into three equal chunks and then reverse them. Input the list such that the number of elements are divisible by 3.

For example :

Input :

```
sample_list = [11, 45, 8, 23, 14, 12, 78, 45, 89]
```

Output :

Chunk 1 [11, 45, 8]

After reversing it [8, 45, 11]

Chunk 2 [23, 14, 12]

After reversing it [12, 14, 23]

Chunk 3 [78, 45, 89]

After reversing it [89, 45, 78]

5. Write a Python program to create a class representing a stack data structure. Then create methods for the following operations :

- (a) Push()
- (b) Pop()
- (c) Is_empty()

6. (a) Write a Python program to calculate the sine series.

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

For example :

Enter the value of x in degrees : 30

Enter the number of terms : 10

0.5

- (b) Write a Python program to find the GCD of two numbers using recursion.

7. A website requires the users to input username and password to register. Write a program in Python to check the validity of password input by users. Following are the criteria for checking the password :

1. At least 1 letter between [a-z]
2. At least 1 number between [0-9]
1. At least 1 letter between [A-Z]
3. At least 1 character from [!#\$%&@]
4. Minimum length of transaction password : 6
5. Maximum length of transaction password : 12

Your program should accept a sequence of comma separated passwords and will check them according to the above criteria. Passwords that match the criteria are to be printed, each separated by a comma.

Example : If the following passwords are given as input to the program :

ABd1234@1,aF1#, 2w3E*, 2We3345

Then, the output of the program should be : ABd1234@1
