ASSESSMENT

Python and MySQL
assessment test 2 hours

NO	TASK	POINTS
1	Theory questions	20
2	Concept question	8
3	Coding question	8
4	Coding question	8
5	Concept question	8
6	Concept with practical example	8
7	Concept question	8
8	SQL practical question	10
9	Coding question	22
	TOTAL	**100**

1. Python theory questions	**10 points**

1. What is the program?
Program is a step by step instruction that tells the computer what to do.

2. What is the process?
A process becomes a program when it is loaded to the computer memory and is ready to run. Program will be passive (just the code written) and process is active(the actual execution)
3. What is Cache?
Cashe is a small amount of memory which is a part of the CPU and is temporary stored to be used again at some point
4. What is Thread and Multithreading?
A thread is a short executable part of a larger code. When multiple threads are run in a process at the same time, we get "multithreading."

5. What is GIL in Python and how does it work?
Global Interpreter Lock is the lock that protects the interpreter which is not thread-safe. It ensures that only one thread is running at any given time.

6. What is Concurrency and Parallelism and what are the differences?
Concurrency means multiple computations are happening at the same time. Concurrency is the task of running and managing the multiple computations at the same time. While parallelism is the task of running multiple computations simultaneously.

7. What do these stand for in programming: DRY, KISS, BDUF
DRY - Don't Repeat Yourself. In practice this principle requires to avoid dublications when possible and use functions to wrap up the code.
KISS - Keep it Simple, Stupid. In practice - simplify things where possible.
BDUF - Big Design Up Front. In practice not a very cool thing to do, as it is about thinking too much, before actually doing anything.

8. What is Garbage collector? How does it work?
GC manages the allocation and release of memory for a program. Python has an automated GC, it releases the memory automatically when the object is not in use.
9. What are 'deadlock' and 'livelock' in a relational database?
When two or more transactions are waiting for one another to give up locks.
When two or more transactions change their state continuously, with neither of them making progress

10. What is Flask and what can we use it for?
Flask is a third-party Python library used for developing web applications.

2. Discuss the difference between Python 2 and Python 3	**8 points**

Python 3 is more in-demand today and has simpler syntax. Python 2 is considered outdated today and uses an older syntax.
Maind syntax differences: Division, print operator, Unicode P3 instead of ASCII P2, xrange, error handling, __future__ module

3. Write a function that can define whether a word is a Palindrome or not (a word, phrase, or sequence that reads the same backwards as forwards, e.g. *madam*) — **8 points**

```
def tellifpalindrome(string):
    count_start = 0
    count_end = len(string) - 1

    while count_end >= count_start:
        if not string[count_start] == string[count_end]:
            return False
        count_start += 1
        count_end -= 1
    return True


string = "reviver"

if tellifpalindrome(string):
    print("The word  " + string + "  is a palindrome")
else:
    print("The word  " + string + "  is not a palindrome")
```

4. Write tests for the newly created Palindrome function. Provide a brief explanation for your test case options.
 	
`import unittest`
`from A2Palindrome_DI import tellifpalindrome`
 	
`class A2PalindromeDI(unittest.TestCase):`
`  def tellifpalindrome(self):`
`  self.assertEqual(tellifpalindrome("reviver"), True)`
`  self.assertEqual(tellifpalindrome("elephant"), False)`
 	
`  def tellifpalindrome(self):`
`  self.assertTrue(tellifpalindrome("reviver"))`
`  self.assertTrue(tellifpalindrome("elephant"))`
 	
`if __name__ == '__main__':`
`  unittest.main()`
	8 points

5. Agile methodology, Scrum: name at least 3 types of meetings that are exercised by Agile teams and describe the objective of each meeting.	**8 points**

Sprint planning - one of the most important meetings for the whole team. The product owner will define the priorities from the backlog and assign them to the development team. Each point will be discussed with development team memebers and the time will be assigned.
Daily Stand-up- a quick daily meeting to share updates and keep everyone accountable, mostly what has been achieved since the previous day, plan for the current day and any issues that can be on the way.
Retrospective - Feedback session where all the aspects of the sprint are discussed. If there are any problems or delays the team comes up with the action plan.

6. Exception handling in Python, explain what each of the following blocks means in the program flow: Try, except, else, finally	**8 points**

We use try to see if the block of code has any errors.

We use except to catch and handle the errors

We use else to let the code run when we don't have any errors

We use finally to run the code ignoring the result of try and except

7. How can we connect a Python program (process) with a database? Explain how it works and how do we fetch / insert data into DB tables from a python program.	**8 points**

Python can be connected to multiple databases. We need to start with a connector e.g for sql mysql.connector.

Before inserting data into the DB tables we need to make sure that the connection is established with the right authentication.

8. Given two SQL tables below: authors and books. ● **The authors dataset has 1M+ rows** ● **The books dataset also has 1M+ rows** Create an SQL query that shows the TOP 3 authors who sold the most books in total! SELECT author_name FROM Authors AA JOIN Books BB ON AA.book_name = BB.book_name WHERE BB.sold_copies = (SELECT Max(BB.sold_copies) FROM Books) ORDER BY BB.sold_copies DESC;	**10 points**

AUTHORS

author_name	book_name
author_1	book_1
author_1	book_2
author_2	book_3
author_2	book_4
author_2	book_5
author_3	book_6

BOOKS

book_name	sold_copies
book_1	1000
book_2	1500
book_3	34000
book_4	29000
book_5	40000
book_6	4400

9. TWO NUMBER SUM: **22 points**

- Write a function that takes in a non-empty array of distinct integers and an integer representing a target sum. If any two numbers in the input array sum up to the target sum, the function should return them in an array, in any order. If no to numbers sum up to the target sum, the function should return an empty array.
- Note that the target sum has to be obtained by summing two different integers in the array. You cannot add a single integer to itself in order to obtain the target sum.
- You can assume that there will be at most one pair of numbers summing up to the target sum.

Sample Input: numbers = [3, 5, -4 ,8, 11, 1, -1, 6] target_sum = 10 **Sample**

Output: [-1, 11] the numbers can be in any order, it does not matter.

```
def TwoSum(my_array, target_sum):

    for x in range(len(my_array) - 1):

        for y in range(x + 1, len(my_array)):

            if my_array[x] + my_array[y] == target_sum:

                print([my_array[x], my_array[y]])

            else:

                print([])
```

```
my_array = [3, 5, 2, -4, 8, 11]

target_sum = 7



TwoSum(my_array, target_sum)
```