**THEORY QUESTIONS ASSIGNMENT**

Software Stream

**Maximum score: 100**

KEY NOTES

* This assignment to be completed at student’s own pace and submitted before given deadline.
* There are 10 questions in total and each question is marked on a scale 1 to 10. The maximum possible grade for this assignment is 100 points.
* Students are welcome to use any online or written resources to answer these questions.
* The answers need to be explained clearly and illustrated with relevant examples where necessary. Your examples can include code snippets, diagrams or any other evidence-based representation of your answer.

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| **Theory questions** | **10 point each** |

1. How does Object Oriented Programming differ from Process Oriented Programming?

OOP has a big emphasis on data as objects opposed to POP which is more breaking everything down into functions. OOP is commonly used for UI programming or real time systems. Code can be reused and is encouraged to be reused in OOP. OOP languages are generally considered slower than POP but this is still only noticeable on larger projects.

1. What's polymorphism in OOP?

It is one of the main concepts within OOP and means looking at how an object can perform differently depending on what it is needed for. There are a few ways to determine it within Python. The parent elements are used in the same way as children elements, allowing interchangeability and sharing of behaviour. It can be used with functions and objects, class methods, and inheritance.

It cannot be used in POP.

1. What's inheritance in OOP?

Inheritance is key to the reusability of code. However you don’t always need an element to inherit everything and this can be an issue with inheritance. It involves a parent class and a child class, the latter inheriting a property from the other. Any class can be a parent class, meaning it still uses the same syntax. The child class would pass a parent class as a parameter to access it.

1. If you had to make a program that could vote for the top three funniest people in the office, how would you do that? How would you make it possible to vote on those people?

Would need to make a user input so they can add a name, put a limit on how many names can be given (three). Generate an error if more are given.

After the names have been given, the program tallies the top names and displays them.

Take into consideration – spellings of names/nicknames, maybe use a drop down to tackle this. Displaying results after each vote can cause meta-voting so keep results hidden until all votes collected/time-limit.

1. What's the software development cycle?

It consists of seven steps that go around in a continuous cycle. These steps are

Plan – projects leaders evaluate a project idea. Costs are important right from the beginning.

Requirements – What the program is supposed to do and how to do it.

Design – the look, experience and program requirements

Implement – software development begins

Test and Intergrate – simulating errors and uses

Deploy – being made available to users

Maintain – even though it is released, maintenance is still vital

1. What's the difference between agile and waterfall?

Agile focuses on user input and experience, making software highly responsive. It encourages software to be releases quickly which is beneficial in the fast moving tech markets but projects can veer off-track due to the dependence on feedback.

Waterfall is slower than agile because it waits for each stage to be finished before moving onto the next. This is beneficial though, when testing at each phase for issues and evaluating the work.

1. What is a reduced function used for?

It is called with a lambda function to perform a repetitive operation over pairs that are iterated. Basically, continually applies the function to the sequence in iterated pairs but returns a single value.

1. How does merge sort work

It is a sorting algorithm. It breaks a problem into sub-problems to solve individually. It divides arrays by two continually until a merge sort can be run on the sub-arrays. It duplicates the sub-arrays , keeps the index of sub-arrays and main array, then sorts them ready for merging.

1. Generators - Generator functions allow you to declare a function that behaves like an iterator, i.e. it can be used in a for loop. What is the use case?

Is like an iterator, used to make things like lists and patterns.

Ex. Fibonacci sequence-

def fibonacci\_gen():  
 n1=0  
 n2=1  
 while True:  
 yield n1  
 n1, n2 = n2, n1 + n2sequence= fibonacci\_gen()  
print(next(sequence))  
print(next(sequence))  
print(next(sequence))  
print(next(sequence))  
print(next(sequence))

1. Decorators - A page for useful (or potentially abusive?) decorator ideas. What is the return type of the decorator?

The original object is passed trough the decorator and returned as a modified object. The decorator doesn’t affect he original function but adds to it, making it useful to amend existing code without changing it.