Principles of programming

CT4029

Workbook – Session 1

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Today's session revolves around problem solving tools and techniques that have a significant role in developing any piece of software using a programming language. As discussed in the lecture, there are different tools that are used to visualize the solution before it is programmed, such as; pseudocode and flowcharts. These tools not only help to visualize the solution, they also help to identify a sequence that is pivotal for the process of software development. The exercises in the workbook start from basic problem-solving techniques and then involve Python programming to solve problems.
The workbook is divided in two sections, each section is based around the topics covered in the respective lecture sessions.

1. Section A

Following are the learning outcomes of this section:

- **Problem Solving Tools & Techniques**
- **Pseudocode**
- **Flowcharts**

1.1. Exercise 1

Peter runs a tennis club. He's to organise a knockout tournament. He puts out the sign-up sheet and after a week he has 15 sign-ups. Peter is confused, he can't work out how to organise a knock out tournament with 15 players and doesn't know how many courts to book. He asks Prof. Joe he knows instantly, without giving it a second thought. How does Joe do this? he doesn't have time to plan the whole tournament.

1.2. Exercise 2

100 people stand in a circle in order 1 to 100. No. 1 has a sword. He kills the next person (i.e. No. 2) and gives the sword to the next living person (i.e. No. 3). All people do the same until only 1 survives. Which number survives to the end?

1.3. Exercise 3

There is a computer program, which has only two users; Alice and Bob. When the users enter their name (either Alice or Bob) the program greets them with their names. Write pseudocode and design flowchart for this program.

1.4. Exercise 4

Draw a flowchart for the following scenario:
Level 4 university students are divided into three categories; 1) Business Computing, 2) Computing, 3) Cyber and Computer Security. All level 4 students are required to take three compulsory modules and one optional module. However, some of the modules that are compulsory for Cyber and Computer Security and Computing students are not compulsory for Business Computing students. Your flowchart should be able to satisfy

the conditions defined in the given table, which include the list of compulsory andoptional modules

Modules	Business Computing	Computing	Cyber and Computer Security
Fundamentals of Programming	Compulsory	Compulsory	Compulsory
Computer and Security	Optional	Optional	Compulsory
Smart Business Computing	Compulsory	Optional	Optional
Web Development	Optional	Compulsory	Compulsory
Systems Design and Development	Compulsory	Compulsory	Optional

2. Section B

Following are the learning outcomes of this section:

- **Basic Python Programs**
- **Variables**
- **Input and Output**

2.1. Example 1: Python Program to Print "Hello World"

```
>>> print ("Hello World")
```

Output: Hello World

2.2. Example 2: Add Two Numbers

```
>>> num1 = 4
>>> num2 = 8
>>> total = num1 + num2
>>> print(total)
```

Output: 12

2.3. Example 3: Find Square Root of a Number

```
>>> num = 9
>>> num_sqrt = num ** 0.5
>>> print(num_sqrt)
```

Output: 3.0

2.4. Example 4: Taking Input from User

```
num1 = int (input("Enter First Number :"))
num2 = int (input("Enter Second Number :"))
total = num1+num2
print(total)
```

2.5. Exercise 1

Write a Python program to convert Kilometers to Miles

2.6. Exercise 2

Write a Python program to convert Celsius to Fahrenheit

2.7. Exercise 3

Write a Python program, which ask's user to input their age, print their age and the number of years in their retirement