Software Development Techniques

December 2015

Sample Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

Time: 3 hours

The maximum mark for this paper is 100.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.
Question 1

Marks

a) Some programs written in high level programming languages are compiled. Briefly explain what is meant by *compilation*.

4

b) Draw ONE (1) diagram that shows the compilation of a program written in a high level language.

3

c) Draw ONE (1) diagram that shows the compilation of a program written in assembly language and outline how it differs to the compilation of a program written in a high-level language.

3

Total: 10 Marks

Question 2

Marks

a) Define the term *algorithm* and briefly explain what is meant by inputs and outputs.

4

b) Identify TWO (2) properties of a good algorithm and provide a short explanation for each property.

4

c) State TWO (2) reasons why we would use pseudocode to write an algorithm.

2

Total: 10 Marks

Questions continue on next page
Question 3

a) The following pseudocode algorithm calculates the area of a floor so that a carpet can be fitted that is the correct size.

Perform a desk-check on this algorithm using a table to show the values in each variable after the execution of each line. You should assume an input value of 50 for length and 50 for width.

1. data width as whole number
2. data length as whole number
3. data area as whole number
4. output “Welcome to the carpet area calculator”
5. output “What is the width of your floor”
6. input width
7. output “What is the length of your floor”
8. input length
9. area = length * width
10. output “For your floor you will need a carpet that is:”
11. output area
12. output “Thankyou for using this program.”

Total: 10 Marks

Question 4

a) State TWO (2) questions that should be considered when choosing a data type.

b) State what data types should be used for the following variables and explain your answer:

i) The name of a student
ii) The phone number of a student
iii) The age of a student
iv) The height of a student in metres

Total: 10 Marks
Question 5

a) Briefly explain the difference between a bounded loop and an unbounded loop and provide ONE (1) example of when we might use each type of loop.  

b) Write a short pseudocode program that will print out the multiplication table up to 10 for a given input value. For example, if I used the input value of 3 my output would be:

1 x 3 = 3  
2 x 3 = 6  
3 x 3 = 9  
4 x 3 = 12 
5 x 3 = 15 
6 x 3 = 18 
7 x 3 = 21 
8 x 3 = 24 
9 x 3 = 27 
10 x 3 = 30

Total: 10 Marks

Question 6

a) Write a pseudocode algorithm that determines if a given input value is an odd number. It should make appropriate use of variable names and data types.

b) Using a nested if statement, write pseudocode that implements the following rule:

If it is raining, wear a “raincoat” and if it is raining and not windy take an umbrella.

You should use the following variables: (1) data coat as String; (2) data umbrella as Boolean; (3) data raining as Boolean; and (4) data windy as Boolean;

Total: 10 Marks

Questions continue on next page
Question 7

a) Construct a truth table for the logical equation A OR B AND C.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A OR B</th>
<th>(A OR B) AND C</th>
</tr>
</thead>
<tbody>
<tr>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td></td>
</tr>
<tr>
<td>False</td>
<td>False</td>
<td>True</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>False</td>
<td>False</td>
<td></td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>True</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>True</td>
<td>False</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td></td>
</tr>
</tbody>
</table>

b) Explain the effect of brackets on the solution to the equation A OR (B AND C).
You do not need to create a truth table for this question, although it may help your explanation.

Total: 10 Marks

Question 8

a) State FOUR (4) advantages of using functions in programming.

b) The following pseudocode program is used to display the times table of the user’s choice:

1. data userChoice as whole number
2. output “Please enter the times table you would like to calculate:”
3. input userChoice
4. call timesTable(userChoice)
5. output “Goodbye!”

The program uses a function called “timesTable()” to create and display the times table specified in an argument. Write the contents of the function timesTable() in pseudocode.

Total 10 Marks

Questions continue on next page
Question 9

a) Explain the difference between Black box testing and White Box testing. 

b) Briefly discuss why we should perform both black box testing and white box testing. 

c) The following code tests the value in the variable i to ensure that it is greater than or equal to zero:

1. Input i
2. If (i >= 0) Then
3. output studentGrade[i]
4. Else
5. output “value out of range”
6. End if

State THREE (3) values would you use as input if you had to perform a simple boundary test on i.

Total: 10 Marks

Question 10

a) The following class is used to describe objects of type FoodItem. These objects would appear in a menu application for a restaurant. The class is incomplete as it does not contain accessor functions. Write pseudocode accessor functions for this class.

Class FoodItem
    data name as String
    data price as whole number

    // Accessor functions to be written here

End Class

b) Briefly explain why we use Accessor functions in classes.

Total: 10 Marks

End of Examination Paper