UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	COMPUTER ALGORITHM
COURSE CODE	:	DAT13303
PROGRAMME CODE	:	DAT
EXAMIATION DATE	:	JANUARY / FEBRUARY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS.

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THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

SECTION A

State whether the following statements are TRUE or FALSE.

Q1   Sentinel loop is used when the number of iteration is known.

Q2   An array must be declared.

Q3   Data type of each element in an array can be different

Q4   The index of the last element in an array is the same as the total number of elements

Q5   It is not compulsory to explicitly initialize an array.

Q6   The maximum number of dimensions for an array is not two.

Q7   The readability of an algorithm stays the same when using function.

Q8   A function can call itself.

Q9   A function may not receive parameter.

Q10   A function must return a value

SECTION B

Q11   Arrange the following steps to solve a problem by using a computer.
- i. Execute code.
- ii. Problem solved.
- iii. Analyze problem.
- iv. Convert algorithm to code.
- v. Develop algorithm.

     A.   i-iv-ii-iii-v
     B.   iii-v-iv-i-ii
     C.   iii-v-ii-iv-i
     D.   v-iii-iv-i-ii

Q12   Select the **FALSE** statement regarding the characteristic of an algorithm.
     A.   General and well ordered.
     B.   The steps can be interpreted in multiple ways and can be performed without any confusion.
     C.   Effectively computable operations.
     D.   Terminate after a finite number of steps.

Q13　Identify the general rules of naming an identifier.
　　　i.　The first character must be a letter.
　　　ii.　A combination of letters and numbers can be used from the second character onwards.
　　　iii.　Characters representing operators can be used as part of the name.
　　　iv.　Numbers can be used as the first character.

　　　A.　i and ii
　　　B　i and iii
　　　C.　i, ii and iii
　　　D.　All the above

Q14　Determine which of the following are **FALSE** about the && operator.
　　　i.　Connects multiple conditions together.
　　　ii.　Concatenate expression into a single string for output.
　　　iii.　Requires both conditions to be true before executing statement(s) within the selection or iteration structure.
　　　iv.　Requires at least one condition to be true before executing statement(s) within the selection or iteration structure.

　　　A.　i and ii
　　　B.　i and iii
　　　C.　i, ii and iii
　　　D.　ii and iv

Q15　Name the type of operators used in the condition below.

```
If(number > 0 OR number < 10)Then
```

　　　A.　Relational and Logical
　　　B.　Logical and Arithmetic
　　　C.　Relational and Arithmetic
　　　D.　Concatenation

Q16　Determine which comparison expression evaluated **true**. Assume `apple = 10`, `orange = 20` and `lemon = -5`.

　　　i.　apples <> oranges
　　　ii.　lemon <= 5
　　　iii.　apples – lemon
　　　iv.　oranges > 10

　　　A.　i and ii
　　　B.　i and iii
　　　C.　i, ii and iii
　　　D.　i, ii and iv

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Q17 Choose the **TRUE** statement about repetition control structure.

   A. Conditional expression in while loop is evaluated first and if it is true, the associated statement block is executed.

   B. Conditional expression in do-while loop is evaluated first and if it is true, the associated statement block is executed.

   C. In while loop the statement block is executed first and then the conditional expression is evaluated.

   D In while loop, the statement block is executed at least once even if the conditional expression is false at first attempt.

Q18 Determine the problem solved using repetition control structure.

   A. Determine whether a given year is a leap year or not.

   B. Calculate the sum of integers.

   C. Keep asking for password until the correct password is given.

   D. Determine whether a number is even or odd.

Q19 Given the following pseudocode. Determine the car park charge if the condition evaluates false.

```
Start
  Set charge - 0
  Input entry_time, exit_time
  period = exit_time - entry_time
  If period > 1 Then
     charge = 2 + (period * 1)
  Else
     charge = 2
  End if
End
```

   A.   RM 3

   B.   RM 1

   C.   RM 0

   D.   RM 2

Q20 Choose the **CORRECT** statement to describe infinite loop.

   i.   Sequence of statements that loops endlessly.

   ii.   The loop structure has a terminating condition.

   iii.   Repeat a set of instructions until a specific condition is met

   iv.   The loop structure does not have a terminating condition.

   A.   i and ii

   B.   i and iii
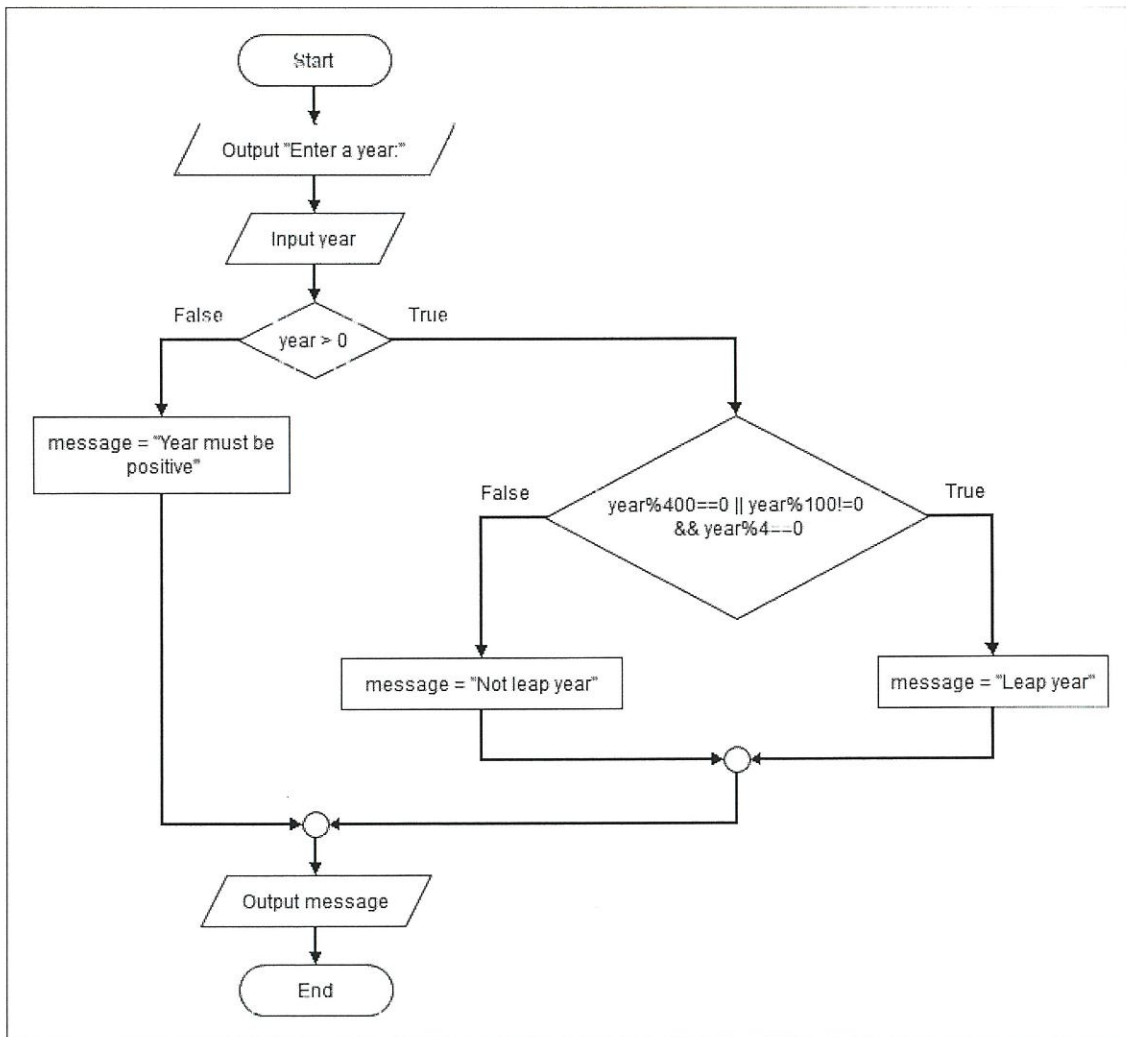
   C.   i and iv

   D.   i, ii and iv

SECTION C

Q21 Convert the following algebraic expressions into expressions in pseudocode.

(a) $\dfrac{3x+2}{4a-1} + 3bc + 4$

(b) $\dfrac{a^2(b^2+c^2)}{a^4 + 4ab^4}$

(4 marks)

Q22 The following flowchart determines whether a year is a leap year or not. Convert the flowchart into a pseudocode.

(6.5 marks)

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Q23   Given the following pseudocode.

```
1    Start
2       Set 0 to a
3       Set 0 to b
4       Set 0 to c
5       Set 0 to idx
6       While idx < 40
7          Read data
8          c = c + data
9          If data > 0
10            b = b + data
11         End if
12         If data % 2 == 0
13            a = a + 1
14         End if
15         idx = idx + 2
16      End while
17      Display "message1: ", a, newline
18      Display "message2: ", b, newline
19      Display "message3: ", c
20   End
```

(a)   Identify the number of times the loop iterates.

(1 mark)

(b)   Convert the pseudocode into a flowchart.

(10 marks)

(c)   Replace `message1`, `message2` and `message3` with suitable messages.

(3 marks)

Q24   Write a pseudocode that generates the following pattern using nested loop.

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

(4 marks)

Q25   Given the following pseudocode.

```
Constant Integer SIZE = 5
Declare Integer numbers[SIZE] = {3, 22, 1, 10, 9}
```

(a)   State the subscript of the biggest data in the array.

(1 mark)

(b)   State the value stored in `numbers[2]`.

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(1 mark)

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(c)   State the value stored in `numbers[3 * 2 - 2]`.

(1 mark)

Q26   Trace the following pseudocode using a tracing table and show the output.

```
1   num[5] = {2, 4, 1, 12, 5}
2   mod[5]
3   Set 0 to x
4   While x < 5
5      mod[x] = num[x] % 2
6      Add 1 to x
7   End while
8   Display "Output: "
9   Set 0 to y
10  While y < 5
11     Display mod[y], " "
12     Add 1 to y
13  End while
```

(4 marks)

Q27   Using an iteration control structure, write a pseudocode that generates the number pattern -25, -20, -15, -10, -5, 0, 5, 10, 15, 20, 25.

(3 marks)

Q28   Write a pseudocode that ask the user to enter a number and display the answer. Then, ask the user whether they wish to continue entering a number or not. If they wish to continue, ask them to enter a number and display the answer again. Otherwise, terminate the program. You must use an iteration control structure. Below is an example of the expected screen.

```
Enter a number: 2
Answer: 4

Do you wish to continue [Y / N]: Y
Enter a number: 7
Answer: 49

Do you wish to continue [Y / N]: Y
Enter a number: 11
Answer: 121

Do you wish to continue [Y / N]: N
```

(4 marks)

Q29   There are 20 students in a Mathematics class. Each of them is required to sit for three tests. Using the two-dimensional (2D) array `score[20][3]`, write a pseudocode for each of the following question.

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(a) Read and store the score data for each student. Below is an example of the expected screen.

```
Score student 1 test 1: 90
Score student 1 test 2: 95
Score student 1 test 3: 80
Score student 2 test 1: 70
Score student 2 test 2: 75
Score student 2 test 3: 87
:
Score student 20 test 3: 98
```

(3.5 marks)

(b) Calculate and display the average score for each student. Below is an example of the expected screen.

```
Average score student 1: 88.3
Average score student 2: 77.3
:
Average score student 20: 95.9
```

(2.5 marks)

(c) Calculate and display the average score for each test. Below is an example of the expected screen.

```
Average score test 1: 95.9
Average score test 2: 89.5
Average score test 3: 86.2
```

(4 marks)

(d) Convert the pseudocode you have created in **Q29(a)**, **Q29(b)** and **Q29(c)** into a single flowchart.

(9.5 marks)

Q30 Given is the information about the software produced by M Corporation.

Category	Version	Price (RM)	Year
W	3.1	2500	2003
S	4.0	1200	2008
D	4.3	3500	2000
C	3.0	3000	2010
W	3.1	2500	2003
S	4.0	1200	2008
D	4.3	3500	2000
S	3.2	3300	2012
D	4.4	3800	2009
C	4.0	3500	2009

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Write a pseudocode for the following functions.

(a) Function `countSoftwareCategory` counts the number of software by category and displays the result in the following form.

```
Category     Quantity
--------------------
W               ?
S               3
D               3
C               2
```

This function has the following prototype:

```
countSoftwareCategory(String category[])
```

(11.5 marks)

Function `totalPrice` calculates the total price of all software produced from the year 2008 until 2010 and returns the total price. This function has the following prototype:

```
float totalPrice(integer year[], float price[])
```

(4.5 marks)

(b) The `main` function calls the function in **Q30(a)** and **Q30(b)**, and displays the total price of all software produced from the year 2008 until 2010. Assume the data have been entered.

(2 marks)

-END OF QUESTIONS -

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