Final Examination
Semester 2 / Year 2011

COURSE : PROGRAMMING LOGIC AND DESIGN
COURSE CODE : CCIS1003
TIME : 2 1/2 HOURS
DEPARTMENT : COMPUTER SCIENCE
LECTURER : LIM PEI GEOK

Student’s ID :
Batch No. :

Notes to candidates:
1) The question paper consists of 5 pages.
   ■ Section A: 10 questions (25 marks)
   ■ Section B: 4 questions (75 marks)
2) Answer all questions in Section A and answer any THREE out of FOUR questions in Section B.
3) Return the question paper with your answer booklet.
SECTION A: MULTIPLE CHOICE QUESTION (10 X 2.5 = 25 MARKS)

Identify the letter of choice that best completes the statement or answer the question.

1. Which of the following structure begin with a diamond shape in a flowchart?
   a. Decision and loop
   b. Sequence and selection
   c. Sequence and loop
   d. Single-alternative if and sequence

2. Which of the following is a typical processing instruction?
   a. print answer
   b. get password
   c. average = totalNumber / count
   d. display count

3. Start
   Get age
   If (?) then
     display “Teenager age”
   endif
   Stop

   Consider the code above. If age is between the range 13 and 19 then it will display “Teenager age”. Which of the following statements can be replaced in (?) correctly?
   a. age > 13 AND age < 19
   b. age >= 13 AND age <= 19
   c. age < 13 AND age > 19
   d. age > 13 between age < 19

4. The structure in which you ask a question and depending on the answer, take some action and then ask the question again, can be called all of the following except ____.
   a. if-then-else
   b. loop
   c. repetition
   d. iteration

5. while rep < 5
   print “Warning”

   What is wrong with the above?
   a. Loop control variable is not initialized
   b. Loop control variable is not altered.
   c. End-structure statement is missing.
   d. a, b and c
6. Which of the following is equivalent to the following decision?
   if  x > 10 then
     if  y > 10 then
       display “x”
     endif
   endif

   a. if x > 10 OR y > 10 then display “x”  
   b. if x > 10 AND x > y then display “x”  
   c. if x > 10 AND y > 10 then display “x”  
   d. if y > x then display “x”

7. Which of the following is not a valid name for a module?
   a. calculateAverage()  
   b. Calculate Avearge ()  
   c. calculate_average()  
   d. CALCULATEAVERAGE()

8. The benefit of modularization is to breaking the programs into reasonable units called _______. Which of the following is not appropriate to fill in the blank?
   a. modules  
   b. subroutines  
   c. steps  
   d. methods

9. The subscripts of any array are always ____.
   a. character  
   b. symbol  
   c. fraction  
   d. integer

10. set val = 1
    for count = 1 to 5
        num[count] = val
        val = val + num[count]
    endfor

    Consider the pseudocode above. What is the final value stored in value variable?
    a. 11  
    b. 16  
    c. 20  
    d. 21
Answer **THREE** out of **FOUR** question in the answer booklet provided. Every question carries **25** marks.

**Question 1**

a) Write a pseudocode that print numbers from 2 to 30 in increments of 3. The output of your program should be:

\[
\begin{align*}
2 & \quad 5 & \quad 8 & \ldots & \quad 30 \\
\end{align*}
\]

You are required to display the output using
i. For loop (5 marks)
ii. do while loop (5 marks)

b) Design an algorithm to read a series of integers. The first integer is special, as it indicates how many more integer will follow. Your program then calculates the sum of the integers, excluding the first integer and displays the sum value to the screen.

i. Create IPO chart for the program (5 marks)
ii. Draw a flowchart for the program (10 marks)

**Question 2**

a) Design an algorithm using pseudocode to ask user to enter school name. The program needs to display a principal name and phone number based on the school name entered by the user. Use the following table to determine the appropriate principal name and phone number. The program should display an error message when the school name does not appear in the table. (10 marks)

<table>
<thead>
<tr>
<th>School</th>
<th>Principal</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Center</td>
<td>June Davis</td>
<td>111-9999</td>
</tr>
<tr>
<td>Lewis Middle School</td>
<td>Matt Hayes</td>
<td>111-8888</td>
</tr>
<tr>
<td>Allen High School</td>
<td>Perry Thomas</td>
<td>111-2222</td>
</tr>
</tbody>
</table>
b) Design an algorithm that will read two integer numbers and an integer code from user. The value of the integer code should be 1, 2 or 3. The table below specifies the process to be taken based on the integer code. The program displays the computed result to the screen.

<table>
<thead>
<tr>
<th>Integer code</th>
<th>Tasks/Actions to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compute the sum of the two numbers</td>
</tr>
<tr>
<td>2</td>
<td>Compute the difference of the two numbers (first number – second number)</td>
</tr>
<tr>
<td>3</td>
<td>Compute the product of the two numbers</td>
</tr>
<tr>
<td>Other</td>
<td>Display error</td>
</tr>
</tbody>
</table>

i. Create IPO chart for the program (5 marks)
ii. Draw the flowchart for the program (10 marks)

**Question 3**

a) What is the output for the following pseudocode? (5 marks)

Start
Set x = 1, y = 10
do
  x = x + 2
  y = y – 1
  display x, y
while (x<y)
Stop

b) In the following pseudocode, determine the value of sum after the for loop is executed. (5 marks)

Start
Set sum = 0
for counter = 0 to 4 +1
  num = counter * 2
  sum = sum + num
endfor
  display sum
Stop

c) Design an algorithm that will get an array of 10 character letters, count the number of vowels in the array. A letter, such as a, e, i, o, and u in the English alphabet represents a vowel. The algorithm is then to display the number of vowels in the array.

i. Create IPO chart for the program (5 marks)
ii. Write a pseudocode for the program (10 marks)
**Question 4**

a) Rewrite the following pseudocode so the discount calculations are in a module named as computeDiscount(). The module computeDiscount() will return the discount to main program. (9 marks)

Start
   Get unitPrice and quantity
   totalAmount = unitPrice * quantity
   if(quantity > 5) or (totalAmount > 100) then
      discount = 0.1
   else
      discount = 0
   endif
   discountAmount = discount * totalAmount
   totalAmount = totalAmount – discountAmount
   display totalAmount
Stop

b) Design an algorithm that read employee’s name, hours worked and hourly rate. Use method computeSalary() to calculate the salary and return the salary to main program. Use displayInformation() to display the employee’s name and salary. (You should calculate the salary by multiply hours worked with hourly rate).

i. Draw the hierarchy chart for the program (5 marks)
ii. Draw the flowchart for the program (11 marks)