*注意：請於答案卷上依序作答，並註明作答之大題及題號。

Part I Multiple choice (單選題) (30%)：請於試卷上「選擇題作答區」內依序作答。
Instruction: Please select the letter of the most appropriate answer for each question.

1. Which of the following data structure is LIFO (last in first out)?
(a) stack (b) set (c) map (d) queue

2. Which of the following technologies are NOT developed for Web 2.0?
(a) wiki (b) RSS (c) Blog (d) CGI

3. In symbolic logic, the logic state NOT (*A* AND *B*) is equal to
(a) *A* OR *B* (b) (NOT *A*) AND *B* (c) (NOT *A*) OR (NOT *B*) (d) (NOT *A*) AND (NOT *B*)

4. Which of the following computer languages is an object-oriented language?
(a) c (b) Fortran (c) Pascal (d) C#

5. In order, from slower to faster devices in terms of I/O are:
(a) DVD disc, floppy disk, hard drive, flash memory
(b) floppy disk, DVD disc, flash memory, hard drive
(c) floppy disk, DVD disc, hard drive, flash memory
(d) floppy disk, flash memory, DVD disc, hard drive

6. The data transfer rate of ADSL is 8 Mbit/sec. This rate is approximately equal to
(a) 800 kbit/sec (b) 1 Kbyte/sec (c) 17.9 minute/Gbyte (d) 0.3 hour /Gbit

7. A number which decimal (十進位) value is 22. Converting this number to a binary (二進位) value will be:
(a) 10110 (b) 10101 (c) 101011 (d) 10111

8. The union of set *A*{a, b, c} and set *B*{b, c, d} is
(a) {a, b, c, d} (b) {a, b, b, c, d} (c) {a, c, d} (d) {a, d}

9. Which statement is NOT suitable definition about artificial intelligent (AI)?
(a) the study and design of a system that perceives its environment and takes actions which maximizes its chances of success.
(b) the study of the computations that make it possible to perceive, reason and act.
(c) the study of making machines look like human beings.
(d) the study of creating machines that perform functions that require intelligence when performed by people.

10. Which computation method is to simultaneously execute the same task (split up and specially adapted) on multiple processors in order to obtain results faster?
(a) parallel computing (b) batch computing (c) sequential computing (d) interactive computing

見背面

Part II Question and Answer (簡答題) (35%)

Instruction: Write brief but complete answer for each of the following questions

1. Please list five principles when you design the user interface of an online learning system for senior engineers. (10%)

2. Please briefly explain what a call-by-reference parameter is. And please list the advantage and disadvantage of call-by-reference parameters used in a computer program. (10%)

3. The pseudocode of function *F* is shown in figure 1. When an array *A* (10, 5, 3, 6, 8) is passed to *F*, please list all the output (with correct order) of this function. (15%)

```
Array A={10,5,3,6,8}
Function F(Array A){
   for each i in 1 to Length(A) do:
     for each j in Length(A) downto i+1 do:
       if A[j-1] > A[j] then
         Swap(A[j-1], A[j])
      end if
       Print(A)
     end for
  end for
  return A;
}
Function Length(A){
  return the length of the array
}
Function Swap(E1, E2){
  swap the value between E1 and E2
}
Function Print(A){
  print the elements in array A with order on the screen
}
```

Figure 1. Function F Pseudocode.

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Part III Programming (程式題) (35%)

Instruction: You should write the computer functions using one of the following programming languages: Fortran, C, C++, C#, or Java. Code comments are necessary if the statement is not straightforward. The computational efficiency, exception handling, and programming style will be considered in grading.

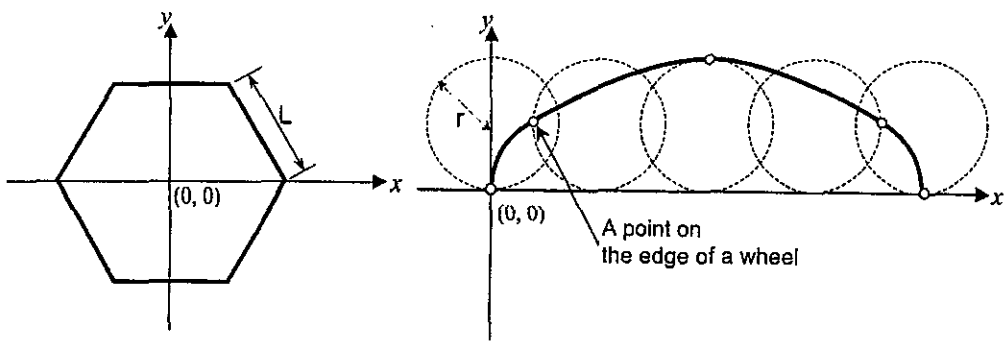
Assume a computer screen is presented by an *x-y* coordinate system. You are asked to write computer functions to draw some specific shapes. The following functions can be used in your program.

- *drawPoint*(*x*, *y*) *//Draw at point (x, y).*
- *drawLine*(*x*1, *y*1, *x*2, *y*2)*// Draw a line from point* (*x*1, *y*1) *to* (*x*2, *y*2)
- *cos*(*angle*) *// Assign the angle in degrees the functions will return its cosine value*
- *sin*(*angle*) *// Assign the angle in degrees the functions will return its sine value*

1. Please write a function *drawHexagon* (*L*) to draw a hexagon shown in figure 2 (a). The center of the hexagon locates at (0, 0) and its length is *L*. (10%).

2. Please write a function *drawPolygon* (*N*, *L*) to draw an N-gon (N邊形). The center of the N-gon locates at (0, 0) and its length is *L*. (10%).

3. Please write a function *drawCycloid* (*r*) to draw a cycloid (擺線) as shown in Figure 2(b). A cycloid is the curve defined by the path of a point on the edge of wheel as the wheel rolls along a straight line. The cycloid starts from (0, 0), and the radius of the wheel is *r*. (15%).



(a) Hexagon　　*(b) Cyloid*

Figure 2. Illustrations of function outputs.

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