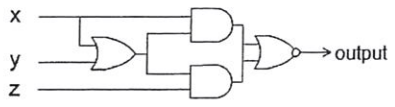
元智大學 107 學年度 轉學考 招生試題卷

系(所)別：資訊工程學系學士班　組別：資訊工程學系2年級　科目：計算機概論　用紙第1頁共2頁

●不可使用電子計算機

1. Suppose a circuit using AND, OR, and NOT gates is shown below, please determine the Boolean expression for the circle. [10%]



2. Suppose x=10, y=-6, please perform the following operations and represent the results in 5-bit two's complement notation. An overflow flag will be raised if an overflow occurs. [10%]

(a) x+y [2.5%]　(b) x-y [2.5%]　(c) -x+y [2.5%]　(d) -x-y [2.5%]

3. Define the term "process" as it is used in the context of operating systems, and justify the difference between a process that is ready and a process that is waiting. [10%]

4. Describe the steps followed by a machine that wants to transmit a message in a network using the CSMA/CD protocol. [10%]

5. Suppose the bus of a computer system transmits 4-byte information in one bus cycle, one bus cycle takes two clock cycles, and the bus clock frequency is 20MHz. What's the bandwidth of the bus? [10%]

6. Using the commands SELECT, PROJECT, and JOIN, write a sequence of instructions to answer each of the following questions and their manufactures in terms of the following database: [10%]

COURSE relation	
CourseName	Credit
Math	5
English	3
Computer	1
Biology	2

STUDENT relation		
StudentName	CourseName	Score
Student A	Math	95
Student B	English	82
Student B	Math	86
Student B	Biology	92
Student C	Computer	98
Student C	English	86

(a) Which students take English course? [3%]
(b) Obtain a list of the courses taken by Student B along with each course's score. [3%]
(c) Which students take a course with credit 5? [4%]

7. Suppose the in-order traversal of a binary tree is DCBGEAHFIJK, and the post-order traversal is DCEGBFHKJIA, so what the pre-order traversal would be? [10%]

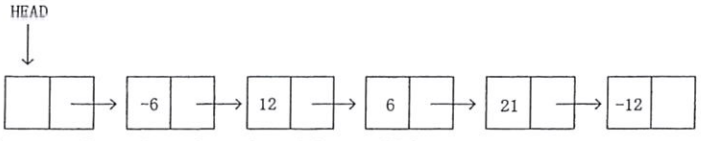
8. Reading the Function f1, and consider the following questions: [10%]

```
Function f1
1  void f1 (Queue *Q) {
2     DataType   e;
3     If (!QueueEmpty (Q) ) {
4        e = DeQueue(Q);
5        f1 (Q);
6        EnQueue (Q,e);
7     }
8  }
```

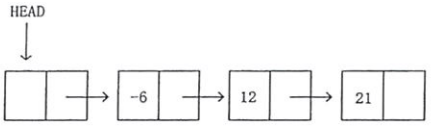
(a)Suppose a sequence Q = (2,9,6,4,8,1), what would Q be after executing **Function f1**? [5%]

(b)Describe the effect of **Function f1**. [5%]

9. Suppose we use singly-linked list to store *m* integers, the structure of a node is [data][link], |data| ≤ *n*. Please design a time-efficient algorithm with the requirements: for the nodes with equal absolute values in the linked list, only the node that appear for the first time is retained and the remaining nodes with equal absolute values are deleted. For example, given the linked list as follows:



The list after performing the algorithm will be:



(a) Define the singly-linked list nodes using C/C++ languages; [3%]

(b) Describe your idea about the algorithm (It can be presented by texts or C/C++ languages); [3%]

(c) Discuss the time and space complexity of your algorithm. [4%]

10. What do you think about artificial intelligence? Since artificial intelligence changes our lives in many ways, would you have any concerns? Justify your answer. [10%]