淡江大學 101 學年度轉學生招生考試試題

系別： 資訊工程學系三年級　　　　科目：資 訊 概 論

考試日期：7 月 17 日(星期二) 第 3 節　　　　　本試題共　6　大題，　2　頁
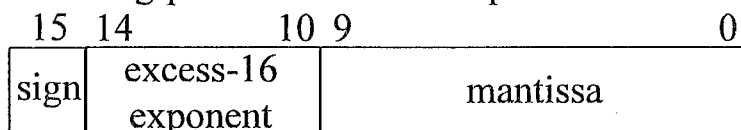
1. (15%) Multiple-choice question.

a. The ___ layer of the TPC/IP protocol suite is responsible for node-to-node delivery of a frame between two adjacent nodes.

   (A) data-link　(B) network　(C) transport　(D) application

b. In two's complementary addition, if there is a final carry after the leftmost column addition, ___ .

   (A) add it to the rightmost column　(B) add it to the leftmost column　(C) discard it

   (D) increase the bit length

c. ___ is a step-by-step method for solving a problem or doing a task.

   (A) A construct　(B) A recursion　(C) An iteration　(D) An algorithm

d. ___ is an ordered collection of data in which each element contains the location of the next element.

   (A) An array　(B) A stack　(C) A linked list　(D) A queue

e. Multiprogramming requires a ___ operating system.

   (A) batch　(B) time-sharing　(C) parallel　(D) distributed

2. (35%) Suppose the floating-point numbers are represented in the following 16-bit format:

15	14　　　　10	9　　　　　　　　　0
sign	excess-16 exponent	mantissa

The 10-bit mantissa is normalized and has an implied base of 2. Answer the following questions.

(a) Represent the real number: $-12.3125_{(10)}$.　　　　　　　　　　　　　(10%)

(b) Suppose a real number represented in this format is 0011010111010100. What is the decimal value of the number?　　　　　　　　　　　　　　　　　　　　　　(7%)

(c) What is the range of the exponent?　　　　　　　　　　　　　　　　　　(6%)

(d) What are the largest and the smallest *positive* numbers that the format can represent?　(6%)

(e) What are the largest and the smallest *negative* numbers that the format can represent?　(6%)

3. (15%) Use Dijkstra's algorithm to find the shortest path from vertex v_3 to all other vertices for the graph represented by the following adjacency matrix. Show the actions step by step.

	1	2	3	4	5	6
1	0	∞	72	50	90	35
2	∞	0	71	70	73	75
3	72	71	0	∞	77	90
4	50	70	∞	0	60	40
5	90	73	77	60	0	80
6	35	75	90	40	80	0

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4. (15%) Let T be a binary tree. Given that the inorder sequence of $T=$ **DBHJEAFKICG** and the postorder sequence of $T=$ **DJHEBKIFGCA**, answer the following questions.
   (a) What is the preorder sequence of T? (10%)
   (b) Draw the binary tree T. (5%)

5. (10%) Describe CSMA/CD protocol.

6. (10%) Answer the following questions.
   (a) To achieve acceptable sound quality, music on today's CDs is recorded with a sample rate of 44.1 KHz. Each sample is represented by 65536 different levels for stereo recordings. Suppose the compression ratio of MP3 can reach 1:12. How many bytes are needed to represent a 5-minute audio signal in MP3 format? (5%)
   (b) If a TrueColor picture is composed of 100×100 pixels, how many bytes are needed to represent the picture? (5%)