國立聯合大學九十七年度碩士班考試招生
管理碩士學位學程 入學考試試題

科 目：計算機概論

第 1 頁共 2 頁

30% 1. Terminology Explanation
   (a) LIFO (last in first out)
   (b) Content Switch
   (c) Paging
   (d) LAN (Local Area Network)
   (e) URI (Uniform Resource Identifier)
   (f) RFID (Radio Frequency Identification)
   (g) Web Service
   (h) Integrity (one of the four aspects of security)
   (i) CMMI (Capability Maturity Model - Integrated)
   (j) Non-Repudiation (one of the four aspects of security)

5% 2. Convert the following numbers:
   (a) 346_{10} into hexadecimal representation (base 16).
   (b) -17_{10} into binary representation (base 2, using two's complement 8-bits)
   (c) 00110100₂ into decimal representation (base 10).
   (d) 23₄ into decimal representation (base 10).
   (e) 0.125₁₀ into binary representation (base 2).

5% 3. Consider the following function:

   ```c
   int func (int a, int b)
   {
   if (a == 0)
   return(b);
   else return (func (a-1, b/4));
   }
   ```

   What is the final returned value if the function func is called with func (3, 1024)?

10% 4. Read the following data in the given order, and show the corresponding trees.
   7, 8, 9, 2, 1, 5, 3, 6, 4
   (a) Binary Search Tree
   (b) AVL Tree
   (c) Max Heap Tree

10% 5. Given the following graph,

   (1) Find the minimum spanning tree using the Kruskal’s algorithm step by step.
   (2) Find the minimum spanning tree using the Prim’s algorithm step by step (Starting from a).
   (3) Write a program or an algorithm of the Kruskal’s algorithm. Describe your data structure and using
   the following graph as example.

   ![Graph Diagram]
6. Which of the OSI layers is (are) involved in each of the following activities:
   (a) Sending a frame to the next station
   (b) Sending a packet from the source to the destination
   (c) Sending a long message from the source to the destination
   (d) Logging into a remote computer
   (e) Changing the data from the machine code to Unicode

7. Use object-oriented programming language (e.g. C++ or Java) to design a class with the following data members and member functions.
   (a) sid: an integer to represent student id.
   (b) name: a string to represent student name.
   (c) score[7]: an array of integers to represent scores of the student.
   (d) a constructor with parameters of sid and name.
   (e) read(): a function to read the scores from console.
   (f) pass(): a function to return an integer counting the number of scores more than 60.
   (g) average(): a function to return the max score.
   (h) std(): a function to return the standard deviation of the scores. The formula is $\sqrt{\text{SUM}(S_i - \text{AVERAGE})^2/n}$.
   (i) display(): a function to display the name, sid, scores, number of pass and average score.

8. If you plan to implement a system for graduated classmate gathering and you have collected the following data. Please use it for the table design of this information system and answer the following questions.
   (1) What's the normalization? What's its main purpose?
   (2) Please give the Entity-Relation Diagram/Model for this system.
   (3) By using above Entity-Relation Diagram/Model, please find out the tables which have to meet the requirements of the third normal form (3NF)

The Gathering for Graduated Classmate

<table>
<thead>
<tr>
<th>Student ID</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Email</td>
</tr>
<tr>
<td>Telephone</td>
<td>Mobile phone</td>
</tr>
<tr>
<td>Address 1</td>
<td>Title</td>
</tr>
<tr>
<td>Address 2</td>
<td>Working Address</td>
</tr>
<tr>
<td>Company Name</td>
<td>Company Phone</td>
</tr>
</tbody>
</table>

Location and Date for Gathering

<table>
<thead>
<tr>
<th>Date</th>
<th>2007/05/30 8:00AM</th>
<th>Organizer</th>
<th>Peter Wang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Sun Moon Lake</td>
<td>Attendance</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

Location Introduction

Sun Moon Lake is located in the center of Taiwan and is the island's largest lake. It is a beautiful alpine lake, divided by the tiny Lalu Island; the eastern part of the lake is round like the sun and the western side is shaped like a crescent moon, hence the name "Sun Moon Lake".