考　試　科　目	計算機概論 （網路與多媒體） 5/5>3	所　別	數位內容碩士學位學程 資訊技術組	考試時間	二月-8日（六） 第3節

以下問題可用中文或英文回答。

1. **(10 points; 2 points for each) True or False.** Please write **O** (for true) or **X** (for false) as an answer to each of the following statements.

   (1) The value 1001101 based on 2 is equivalent of the base 8 value 111.

   (2) The smallest integer represented by 8 bits in two's complement format is -128.

   (3) For solving a problem, the divide-and-conquer approach first divides the given problem into sub-problems, conquers or solves each sub-problem, and then combines solutions for sub-problems into a solution for the given problem.

   (4) Data structures *queue* and *stack* behave in the same way, because they both are used to hold a collection of data items and allow data items to be inserted into as well as removed from a collection in an arbitrary order.

   (5) For a singly linked non-circular list, the time required to remove the first data item from the list depends on the number of data items in the list, i.e., the time complexity is $O(n)$.

2. **(30 points; 3 points for each) Single Selection.** Please select one of the choices for each of the following questions.

   (1) Which one of the following binary numbers is the result of the binary number 0011 XOR (the logical operation *exclusive or*) the binary number 0111?
   (a) 1100　(b) 1010　(c) 0110　(d) 0100

   (2) What is the largest integer represented by 8 bits in two's complement format?
   (a) 127　(b) 128　(c) 255　(d) 256

   (3) Which one of the following sorting algorithms is the most efficient one in the worst case?
   (a) Selection sort　(b) Quick sort　(c) Merge sort　(d) Insertion sort

   (4) Which one of the following techniques is the most similar to the technique of web proxy?
   (a) Cache　(b) Virtual machine　(c) Multi-core processors　(d) Cloud computing

   (5) What is the data type of the following C codes: **int *ptr;**
   (a) int　(b) address　(c) pointer of int　(d) None of the above

   (6) Which one of the following methods is the best way to select a pivot key for quick sort?
   (a) Mode　(b) The largest number　(c) The smallest number　(d) Median

   (7) Which one of the following programs is NOT a compiler?
   (a) GNU Compiler Collection　(b) Firefox　(c) Javac　(d) Psyco

   (8) Which one of the following programming languages is NOT an object-oriented programming language?
   (a) Java　(b) Fortran　(c) C#　(d) Python

考 試 科 目	計算機概論 （網路與多媒體） 51523	所 別	數位內容碩士學位學程 資訊技術組	考 試 時 間	2月28日（六）第3節

(9) In the OSI (Open Systems Interconnection) 7-layer reference model for communication systems, on which of the following layers are Wi-Fi (IEEE 802.11) and HTTP (Hypertext Transfer Protocol) working respectively?
    (a) Physical Layer and Application Layer
    (b) Physical Layer and Transport Layer
    (c) Network Layer and Application Layer
    (d) Network Layer and Transport Layer

(10) Why the IP address, 103.46.266.70, is INCORRECT?
    (a) It has too few parts.
    (b) It contains an invalid value.
    (c) The numbers should add up to an even number.
    (d) The last number should end with 254.

3. **(25 points; 5 points for each) Term Explanations.** Describe your understanding about the terms.
    (1) VPN
    (2) CPU
    (3) DNS
    (4) FTP
    (5) SSH

4. **(15 points)** Draw the basic computer architecture (also called Von Neumann architecture), and briefly describe the function of each component in the architecture.

5. **(10 points)** Model-View-Controller (MVC) is a popular software architectural pattern for implementing web applications. Please describe the main concepts of the design pattern.

6. **(10 points; 5 points for each) Digitization.**
    (1) What is the difference between the following two digital image files: bitmap and vector images?
    (2) Calculate the file size of a true color (24-bit) image in pixel 512x512. (1 KB = 1024 bytes)

備 註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。