※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題 50 分(每題五分)

1. Which of the following bit patterns represents the value -5 in two's complement notation?

    A. 00011010　　B. 11111010　　C. 00000101　　D. 11111011

2. Which of the following is a technique for controlling access to a critical region?

    A. Spooling　　B. Time sharing　　C. Semaphore　　D. Booting

3. Which of the following would not require real-time processing?

    A. Typing a document with a word processor

    B. Navigation of an aircraft

    C. Forecasting word-wide trade for the next five year period

    D. Maintaining a airline reservation system

4. Which layer of the TCP/IP hierarchy chops messages into units whose size is compatible with the Internet?

    A. Application　　B. Transport　　C. Network　　D. Link

5. The binary search algorithm is an example of an algorithm in which of the following classes?

    A. $\Theta(\lg n)$　　　　B. $\Theta(n)$　　　　C. $\Theta(n \lg n)$　　D. $\Theta(n^2)$

6. Which of the following does not require a Boolean structure?

    A. If-then-else statement　　　B. While loop statement

    C. Assignment statement　　　D. For loop statement

7. Which of the following technologies is your new mobile phone payment device most likely to use?
    A. Token ring　　B. Bluetooth　　C. WiMax　　D. NFC

8. Which of the following is true in a relational database?
    A. Each row and each column has a primary key.
    B. Each row has a unique name and each column has a primary key.

C. Each row has a primary key and each column has a unique name.

D. Each row and each column has a unique name.

9. Which of the following is NOT a strategy that supports green computing?

A. using energy efficient hardware

B. regulating manufacturing processes

C. recycling

D. creating web apps instead of desktop apps

10. The role of memory to store both data and programs is known as which of the following concepts?

A. stored program　　B. random memory　　　　C. ROM　　D. store and send

二、非選擇題 50 分

1. (8%) What are some differences between a transport layer based on the TCP (Transmission Control Protocol) protocol and another based on the UDP (User Datagram Protocol) protocol?

2. (12%) Suppose we find that a machine programmed with our insertion sort algorithm requires an average of one second to sort a list of 100 names. How long do you estimate it takes to sort a list of 1000 names? How about 10,000 names?(Hint: In the average case of the insertion sort, we would expect each pivot to be compared to half of the entries preceding it. This results in half as many comparisons as were performed in the worst case, or a total of $\frac{1}{4}\left(n^2 - n\right)$ comparisons to sort a list of n entries.)

3. (10%) Suppose the expression X[1, 1] referred to the first-row, first-column entry in a two-dimensional array with 5 rows and 7 columns. If the array is stored in row-major order beginning at memory address x and each entry in the array requires n memory cells, what address polynomial would be used to compute the address of the beginning of the entry X[I, J]?

4. (12%)Convert the following infix notation into (a) tree　(b) postfix notation, and (c) prefix notation.
   A1+A2*A3

5. (8%) A Web page has a unique address, called a URL (Uniform Resource Locator) or Web address. Write down the meaning of the four parts (a)-(d) of an URL.

(a)	(b)	(c)	(d)

http:// www. nps. gov /grsm/planyourvisit/wildlifeviewing.htm