

※ 考生請注意：本試題不可使用計算機

1. (10%) Explain the booting process of a computer (please describe how the operating system is loaded when the computer is turned on).
2. (12%) (a) Describe the functions of the application layer, transport layer, network layer, and link layer of Internet software.  
(3%) (b) What layer does the Transmission Control Protocol (TCP) belong to?  
(8%) (c) Explain the differences between a router and a switch.
3. (8%) (a) Briefly explain the binary search algorithm.  
(8%) (b) Express the binary search algorithm in pseudocode or the programming language of your choice.
4. (8%) (a) Explain the following concepts used in object-oriented programming: (i) Classes (ii) Methods.  
(3%) (b) Which of the following programming languages is not an object-oriented programming language: (i) C++ (ii) Java (iii) C (iv) C#
5. (5%) (a) Express the following bit pattern in hexadecimal notation: 011001001110  
(5%) (b) What is the value of the least significant bit in the bit pattern represented by the following hexadecimal notation: 7E
6. Identify the mask and logical operation needed to accomplish each of the following objectives:  
(5%) (a) Put 1s in the upper 3 bits of an 8-bit pattern without disturbing the other bits.  
(5%) (b) Put a 0 in the most significant bit of an 8-bit pattern without disturbing the other bits.
7. (2%) How are new entries added to a stack structure? (i) first-in, first-out (ii) last-in, first-out (iii) last-in, last-out
8. (8%) (a) Suppose the input value is 1 ( $N = 1$ ). What is the printed output of the following routine:

```
procedure TEST1 (N)
if (N < 6)
  then (print the value of N;
        apply the procedure TEST1 to the value N +2)
```

- (10%) (b) Suppose the input value is 1 ( $N = 1$ ). What is the printed output of the following routine:

```
procedure TEST2 (N)
if (N < 6)
  then (apply the procedure TEST2 to the value N +2)
Print the value of N.
```