※ 考生請注意：本試題 □可 ☑不可 使用計算機

1. Explain the following terminologies used in IT field. (10%, 2% for each)
   (a) Open network; (b) Abstraction; (c)MIPS; (d) Stack; (e)ALU

2. (a)Describe the bootstrapping process of a general purpose computer. (5%)
   (b)Suppose a computer's memory was constructed using a nonvolatile technology. Why should a section of ROM still be provided for the bootstrap? (5%)

3. Describe the activities of a machine when handling an interrupt. (10%)

4. (a)What is the difference between user-written programs and utility programs provided by the operating system? (5%)
   (b)Explain how multitasking operating systems can obtain higher throughput than systems that performing each task completely before starting the next? (5%)

5. The following program segment is an attempt to compute the quotient (discarding the remainder) of two positive integers. Is the program correct? Give comments for your answer. (10%)

   ```
           assign Count the value 0;
           assign Remainder the value of the dividend;
   Repeat
               assign Remainder the value of Remainder – divisor;
               assign Count the value of Count + 1;
   Until Remainder < the divisor
   assign Quotient the value of Count
   ```

6. In summary, a procedural programming paradigm is emphasis on describing a process that leads to the solution of a problem. Give a similar summary of the declarative, functional, and object-oriented paradigms. (15%)

7. (a) What is the difference between the two following statements? (5%)
   ```
   const cost=100;
   var cost=100;
   ```
   (b) Give the distinction between the **repeat** and **while** loop structures. (5%)

8. (a) What is the purpose of a hash function? (5%)
   (b) Explain how a poorly chosen hash algorithm can result in a hashed file system becoming little more than a sequential file. (5%)

9. Design an algorithm to sort a sequence of integers using a binary heap data structure. (15%)