※ 請在答案卷上**標明題號依序作答**

1. (a)Please explain what a **time-sharing system** is. (5points)
   (b)Identify a situation in a time-sharing system in which a process does not consume the entire time slice allocated to it. (10points)

2. Please explain what **pipelining** is · (5 points)

3.
   Consider the following simple class declarations: (10 points)
   ```
   class Thing {
   public:
          virtual void foo()
          {cout << "Hello!" << endl;}
   };
   class SubThing : public Thing {
   public:
          void foo()
          {cout << "Goodbye!" << endl;}
   };
   ```
   (a) What is the output from the following code?
   ```
   Thing * p1 = new Thing;
   Thing * p2 = new Subthing;
   SubThing * p3 = new Subthing;

   p1->foo();
   p2->foo();
   p3->foo();
   ```

   (b)Suppose that the word "virtual" is removed from the declaration of the Thing class shown above. Now what is the output from the same code?
   ```
   Thing * p1 = new Thing;
   Thing * p2 = new Subthing;
   SubThing * p3 = new Subthing;
   p1->foo();
   p2->foo();
   p3->foo();
   ```

4. Please design an algorithm for printing a linked list in reverse order. (10 points)

5. What is the difference between virtual memory and main memory? (5 points)

6. Please list four activities of a typical operation system. (5 points)

7. Please summarize the booing process. (5 points)

8. List in chronological order the major events that take place when a process is interrupted. (10 points).

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9. Please explain (1) URL (4points)(2) HTTP (3 points) (3) DNS (3 points)
10. Ethernet uses the algorithm of CSMA/DA. Please describe the steps followed by a machine that want to transmit a message using CSMA/CD protocol (10 points).
11. (a) What is the hashing technique? (5 points)

    (b) If a hash file is partitioned into 10 buckets, what is the probability of at least two of three arbitrary records hashing to the same section? (Assume the hash function gives no bucket priority over the others.) How many records must be stored in the file until it is more likely for collisions to occur than not? (10points)

試題必須隨卷繳回