1. (5 %) Please sort the unit order decreasingly.
   - (a) 1 KB
   - (b) 1 Byte
   - (c) 1 TB
   - (d) 1 Bit
   - (e) 1 GB

2. (10 %) Is the following Bare Bones program self-terminating? Explain your answer.

   ```
   while X not 0 do;
       decr X;
   end
   ```

3. (10%) "Computers surely cannot be intelligent - they can only do what their programmers tell them."

   (a) Is this statement correct or not? Please explain your reasoning.

   (b) Define "Intelligence".

4. (10%) There are four levels of intelligence in behavior: Reflex, Intelligence response, Goal seeking and Learning. Given the techniques below, answer which techniques correspond to which level of intelligence and explain the reasons.

   (a) AlphaGo

   (b) AIVA (Artificial Intelligence Music Composer)

5. (10%) Assume there are four buckets in hashing table. The hashing function is: (key value)% (the number of buckets). Each bucket can only keep one key value. When the collision occurs, the solution is to double the numbers of buckets and find a new hashing function to avoid collision.

   (a) What are the hashing results after inserting 8, 11, 21. Please draw the corresponding results. (3%)

   (b) After (a), then insert 16. What is the hashing result? (7%)

6. (10%) In computer science, time and space complexity are taken as functions to quantify programs or algorithms. Describe why we have to analyze time and space complexity

7. (10%) In order to maintain the database integrity, the DBMS use the locking approach to prevent others from accessing data being used by a transaction. Two different locks, shared lock and exclusive lock, are employed.
   (a) Will the deadlock problem happen? Why or why not? Briefly explain it (you can use examples to illustrate).
   (b) How to resolve the deadlock problem if it occurs?

8. (10%) Explain the advantage and shortcoming between TCP and UDP briefly.

9. (10%) Why can time-sharing system let people feel that they use the system simultaneously? Please explain your reason.

10. (15%) Assume you are the system designer for National Theater & Concert Hall Ticketing System and want to keep the ticket selling records to check. Please analyze the requirements and choose the most suitable storage mechanism and indexing structure from the following candidates.

    Singly linked Lists,　　Dynamically Linked Stacks, Dynamically Linked Queues, Doubly Linked Lists,　　Binary Trees,　　Heap,　　Dynamic Hashing, B-Trees

    You should specify the indexing keys for the selections and explain the reasons.