國立台東大學九十七學年度

「資訊管理學系碩士班」招生考試試題

計算機概論

注意事項：(1) 請用橫式作答。
(2) 答案請依序寫在答案卷上（需標示題號，不必抄題）。
(3) 試題隨同答案卷一併繳回。

問答題（共 100 分）

1. Use an example to illustrate the different among “queuing delay”, “transmission delay” and “propagation delay” defined in computer networks. (10%)

2. Suppose you are playing a game which has a graph layout as shown in figure (B). You are a King. In your domain, you have 6 castles (A-F). The edge is corresponding to the road between two adjacent castles. If you put a torch on a castle, the glare from the fire will light up all incident roads. (Example: to put a torch on the castle A will light up the two roads <A,D> and <A,F>.)

   (a) If you want light up all roads in you domain, which castles will you put torches on? (5%)

   (b) Write down your method (algorithm) for the problem (a). (10%)

   (c) If you want to use minimum number of torches to light up all roads in you domain, which castles will you choose? (5%)
   (Hint: this is the vertex cover problem.)

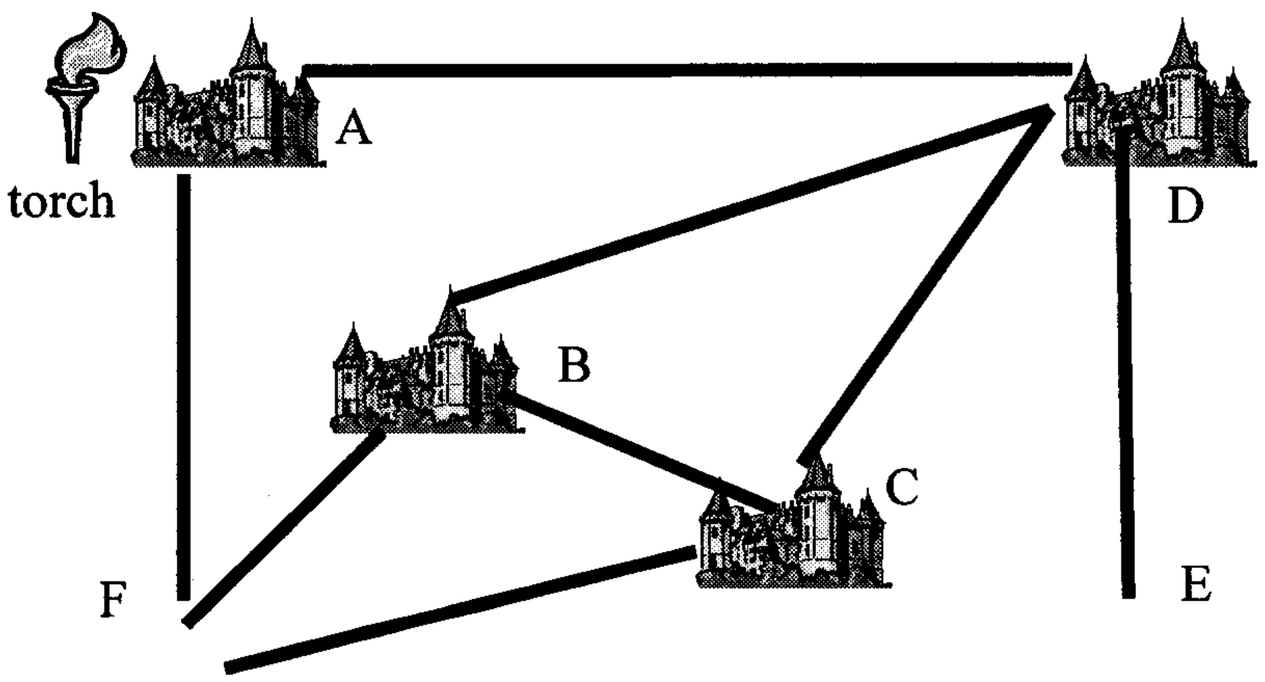
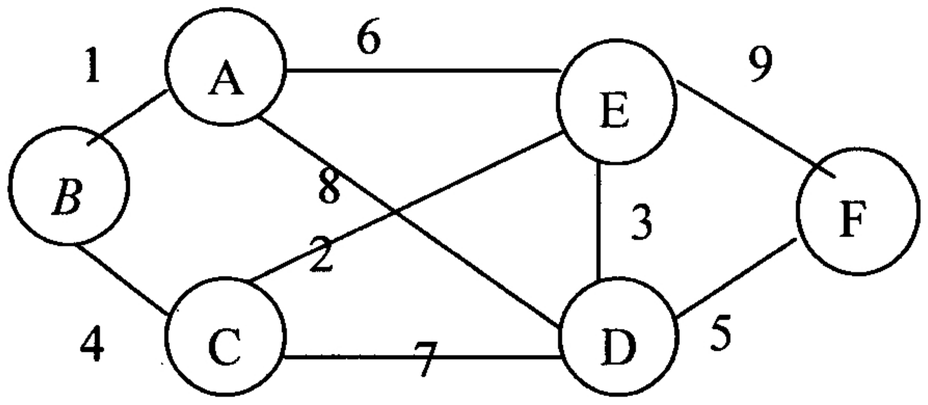


Figure (B)

3. Here are 10 integers: 17, 25, 6, 65, 35, 68, 14, 54, 16, 77. (a) Sort them using Quicksort. Give the status of the list at the end of each phase. (6%) (b) Formulate the recurrence equation for Quicksort. (4%)

4. Use *Prim's* algorithm to find minimum-cost spanning trees of the graph (C) step by step. Let the starting node be A. (10%)



Graph (C)

（第一頁試題結束，請翻頁繼續作答）

5. **What does the main program print?** (10%)

```
class Car
{
  public:
     Car(){ count++; }
     static int getCount(){ return count; }
     ~Car(){count--;}
  private:
     static int count;
};
int Car::count=0;
int main()
{
   Car *c1 = new Car();
   Cout<<Car::getCount()<<endl;
   Car *c2 = new Car();
   Cout<<Car::getCount()<<endl;
   delete c1;
   Cout<<Car::getCount()<<endl;
   delete c2;
   Cout<<Car::getCount()<<endl;
}
```

6. Write a function *transpose(A)* in pseudo code that takes a 3×3 array A and transposes it. For example, if $A = \begin{bmatrix} 1 & 2 & 3 \\ -2 & 0 & 1 \\ -3 & 0 & 0 \end{bmatrix}$, then

$A = \begin{bmatrix} 1 & -2 & -3 \\ 2 & 0 & 0 \\ 3 & 1 & 0 \end{bmatrix}$ after calling `transpose(A)`. (10%)

7. For dynamic linking, a subroutine is loaded and linked to the rest of the program when it is first called. Describe the process and the main advantage of using a dynamic linking library. (10%)

8. What is the difference between a fat-client and a thin-client approach to client-server systems development? Suggest examples for each of the two approaches to illustrate situations where they are likely to be appropriate. (10%)

9. The ORDER and the PRODUCT entity in a context data model are shown below. Normalize the ORDER entity to 3NF. Describe and illustrate each of the three normal forms as you can. (10%)

ORDER
Order-Number (Primary Key) Client-Number (Foreign Key) **1 { Ordered-Product-Number } N** **0 { Ordered-Product-Title } N** **1 { Quantity-Ordered } N** **1 { Purchased-Unit-Price } N** **1 { Extended-Price } N** Order-Status

PRODUCT
Product-Number (Primary Key) Product-Type Product-Title Unit-Price Quantity-in-Stock

（本試題結束）