1. Design a counter with flip-flops that goes through the following binary repeated sequence 0,1,3,7,6,4,2,5.
   (a) Use T flip-flops
   (b) Use JK flip-flops　　　(20%)

2. Given the 11-bit data word 11110110110, generate the 15-bit Hamming code word. (10%)

3. Convert $F(x,y,z) = x'z + x(x+y')(y+z')$ into
   (a) product of maxterms. (5%)
   (b) sum of minterms (5%)

4. (a) What is recursion? Implement a function to determine the Fibonacci number using recursion.
   (b) What is iteration? Implement a function to determine the Fibonacci number using iteration.
   Notes: 1. You may use whatever programming language. 2. The Fibonacci series goes: 0, 1, 1, 2, 3, 5, 8, … (20%)

5. Suppose there is a character sequence S with n characters. You want to sort the characters in this sequence using ascending (升幕) order. Given that each character has a unique value, what shall be your solution? You can use a programming language that you are familiar with, or an unambiguously described algorithm to present your solution. (20%)

6. Suppose you have written the following code to calculate the factorial for a given integer n.

```c
#include <stdio.h>
int factorial(int n)
{
    return n*factorial(n-1);
}
int main(int argc, char* argv[])
{
    printf(" 20! is %d\n", factorial(20));
    return 0;
}
```

Is this program coreect? If yes, what is the output of this program?
If it is incorrect, what is the problem? And what result is going to be generated? (20%)