1. How many memory cells can be in a computer's main memory if each cell's address can be represented by two hexadecimal digits? What if four hexadecimal digits are used? (10%)

2. What is the binary representation of 4 5/8? (10%)

3. What does the bit patterns represent the value -5 in two's complement notation? (10%)

4. The following is a message that was originally encoded so that each pattern had odd parity. Circle the patterns in which an error has definitely occurred. (10%)
   10110101 11110000 10010010 00000000 11111111

5. What value is represented by the bit pattern 01011100 when interpreted using floating-point format in which the most significant bit is the sign bit, the next three bits represent the exponent field in excess notation, and the last four bits represent the mantissa? (10%)

6. Give a code to implement insert operation for a binary search tree. (15%)

7. Given an infix “A+B∗C+D−E∗F”, please find the related binary tree, and its prefix and postfix by using traversal. (15%)

8. Find a minimum cost spanning tree for the undirected connected graph with the cost beside each link shown below and the source node is marked by ‘S’. Please mark the sequence to each link when it is added.
   a. Use Kruskal's algorithm (10%)
   b. Use Prim's algorithm (10%)

```
1
```
```
6
```
```
2 3 7
```
```
9
```
```
5
```
```
S
```

```