系別：資訊工程學系三年級　　　科目：資　訊　概　論

可否使用計算機		
可	否	∨

本試題共 ／＼ 大題， 一 頁

1. Convert a real number 28.375(base 10) to bases 2, 8, and 16. (9%)
   That is, $28.375_{(10)}$ = (   )$_{(2)}$ = (   )$_{(8)}$ = (   )$_{(16)}$

2. Use NAND gate to implement (1)AND gate　(2)OR gate　(3)NOT gate (9%)

3. (12%)Use operations PUSH, POP, and NO-OP(i.e. forward the input to the output directly) of STACK to rearrange an input sequence: ABCD. Write the rearrangements that can be generated.

4. (1)(5%)Write the infix expression of "+-A/BC×DE"
   (2)(5%) Write the postfix expression of prefix expression: "+/+AB×CD×-EF/GH"
   (3)(5%) Write the prefix expression of postfix expression: "AB+CD×/EF-GH/×+"

5. (16%)Answer the following subproblems based on the following graph

  (A)   (B)   (C)   (D)   (E)   (F)   (G)   (H)
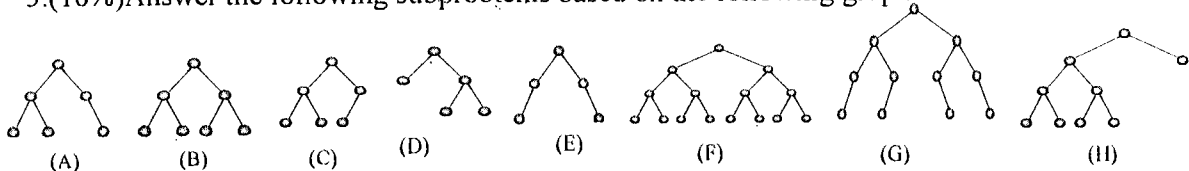
   (1)List the Full Binary Tree
   (2)List the Complete Binary Tree
   (3)List the Balanced Binary Tree
   (4)List the Complete Balanced Binary Tree

6. (9%)Using the median-of-three method to determine the pivot of quicksort, you should determine the running time of quicksort for (a)sorted input ; (b)reverse-ordered input ; (c) random input. You should explain your answer.

7. (10%) Design a O(N) algorithm to compute Fibonacci number F(N). F(N)=F(N-1)+F(N-2) with F(0)=0; F(1)=1.

8. Design an algorithm which can find out and record all pairs of shortest paths of a given weighted directed graph which maybe contain negative weights edge. (10%)　Does your algorithm always work? (2%) If the shortest paths are record in a two dimension arrays PATH, write an algorithm to output the shortest path of (i, j).(8%)