

# 大同大學 100 學年度轉學入學考試試題

考試科目：離散數學

所別：資訊工程學系

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

- 10% 1. Prove that if 101 integers are selected from the set  $S=\{1, 2, 3, \dots, 200\}$ , then there are two integers such that one divides the other.
- 30% 2. (a) Express  $\gcd(252, 198)=18$  as a linear combination of 252 and 198.  
(b) Find two negative and two nonnegative numbers which are inverse of 3 modulo 7.
- 10% 3. Draw the Hasse diagram representing the partial ordering  $\{(a, b) \mid a \text{ divides } b\}$  on  $\{1, 2, 3, 4, 6, 8, 12\}$ .
- 20% 4. (a) For  $G = (Z_{24}, +)$ , find the cosets determined by the subgroup  $H = \langle [3] \rangle$ .  
(b) If  $G = (Z_6, +)$ ,  $H = (Z_3, +)$ , and  $K = (Z_2, +)$ , find an isomorphism for the groups  $H \times K$  and  $G$ .
- 10% 5. Find a recurrence relation and give initial conditions for the number of bit strings of length  $n$  that do not have two consecutive 0s. How many such bit strings are there of length five?
- 20% 6. List the vertices in the tree shown in Fig. 1 when they are visited in a preorder traversal and in postorder traversal.

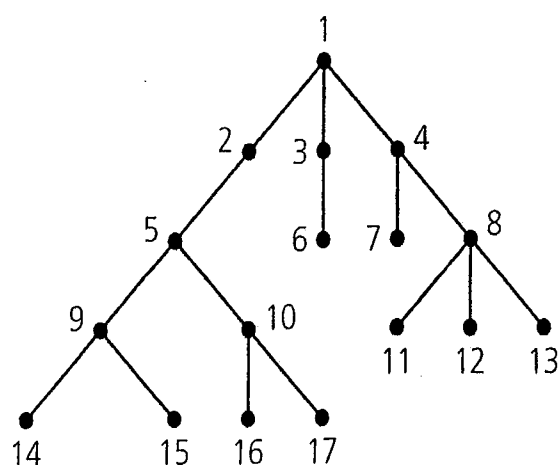


Fig. 1