

國立中央大學 105 學年度碩士班考試入學試題

所別： 資訊管理學系 碩士班 丁組(一般生)

共 / 頁 第 / 頁

科目： 資料結構

本科考試禁用計算器

*請在答案卷(卡)內作答

Question 1: Please describe the three tracing processes based on the following binary tree, given in Fig.1.

(a) PreOrder (11%), (b) InOrder (11%), and (c) PostOrder (11%).

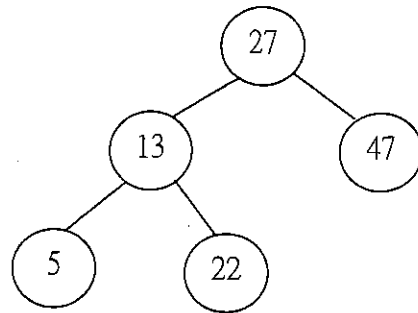


Fig.1

Question 2: Construct an AVL tree by inserting 13, 4, 15, 7, 6, 10, 8, 11, 9, 12, 20, and 30 successively. You should note the balance factor of each node and show all necessary rotations. (10%)

Question 3: According to the graph G in Fig.2,

- (b) Find the adjacency matrix A^+ of G. (4%)
- (c) Find the transitive closure matrix A^+ of G. (5%)
- (d) Explain the meaning of the reflexive transitive closure matrix A^* . (5%)
- (e) Write a program in C language to determine whether there is a path between two arbitrary nodes in a network represented by an adjacency matrix. (10%)

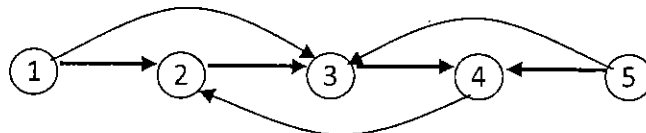


Fig. 2. Digraph G.

Question 4: The equation $y = a * (u - v) + b ** (w + x)$ is given, where the symbols * and ** represent the operators of multiplication and power, respectively.

- (a) Plot a binary tree that can represent the equation. (8%)
- (b) Write down the postfix representation for the equation. (8%)

Question 5: A sequence of data $\{x_i, i = 1, 2, \dots, n\}$ are to be stored sequentially into a two dimensional array $A[0..p-1][0..q-1]$, of which each element occupies two bytes. Assume $n=1000$. The addresses of $A[5][2]$ and $A[3][6]$ are 3000 and 3100 in decimal, respectively.

- (a) To store the sequence of data, find out the smallest size of A in terms of rows and columns. (9%)
- (b) Find out the element of A that will be used to store the single datum x_{205} ? (8%)