

# 國立高雄師範大學 114 學年度碩士班招生考試試題

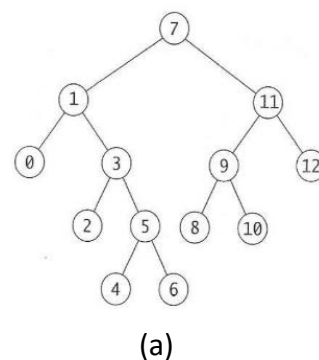
系所別：軟體工程與管理學系

科 目：計算機概論

※注意：1.作答時請將試題題號及答案依序寫在答案卷上，於本試題上作答者，不予計分。

2.答案卷限用藍、黑色筆作答，以其他顏色作答之部分，該題不予計分。

1. (9%) For the binary tree in graph (a), write the results of the inorder traversal, the preorder traversal, and the postorder traversal, respectively.



2. (11%) Write a pseudocode-based recursive algorithm to calculate the  $n^{\text{th}}$  Fibonacci number using memorization. (10%) Additionally, provide a concise proof demonstrating that your algorithm achieves a time complexity of  $O(n)$ .
3. (10%) Describe the DoS (Denial of Service)? How can such attacks be terminated or prevented?
4. (10%) Design a set of Hamming codes  $S_1, S_2, S_3, S_4$ , with code length = 5 bits, Hamming distance  $\geq 3$ .
5. (15%) A program including the instructions shown in the following table runs under a 2GHz CPU. What are the execution time (ns) and Cycle Per Instruction (CPI) of the program?

2GHz CPU Instruction Class	ALU	Store	Load	Branch	Total
Clock cycles per Instruction (ns)	1	5	5	2	-
Number of Instruction	500	50	100	50	700

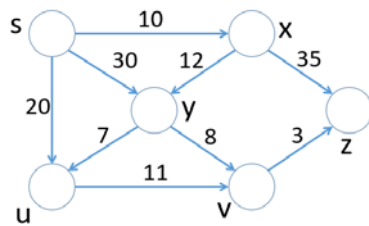
(背面尚有試題)

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6. For graph (b), illustrate the steps and solutions to solve questions (1) and (2):

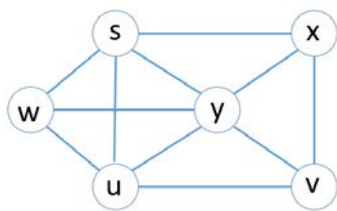
- (1) (10%) Show the ordering of vertices produced by Topological Sorting.
- (2) (10%) Show the shortest path from s to the other vertices using Dijkstra algorithm.



(b)

7. For graph (c), illustrate the steps and solutions to solve the question (1) and (2):

- (1) (7%) Use the approximation algorithm for Vertex Cover to find a solution.
- (2) (8%) Describe what is NP Hard and what is NP-Complete?



(c)