國立成功大學

112學年度碩士班招生考試試題

編　　號：122

系　　所：工程科學系

科　　目：計算機數學

日　　期：0207

節　　次：第 3 節

備　　註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. The number of factors of prime numbers are_____.　(5%)
   (a) 2
   (b) 3
   (c) Depends on the prime number
   (d) None of the mentioned

2. What is the number '1'?　(5%)
   (a) Prime number
   (b) Composite number
   (c) Neither prime nor composite
   (d) None of the mentioned

3. Sum of two different prime number is a _____.　(5%)
   (a) Prime number
   (b) Composite number
   (c) Either prime or composite
   (d) None of the mentioned

4. For any integer m>=3, the series 2+4+6+...+(4m) can be equivalent to _____.　(5%)
   (a) m^2+3
   (b) m+1
   (c) m^m
   (d) $3m^2+4$

5. In preorder traversal of a binary tree the second step is _____.
   (5%)
   (a) traverse the right subtree
   (b) traverse the left subtree
   (c) traverse right subtree and visit the root
   (d) visit the root

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6. An important application of binary tree is _____.　　(5%)
   (a) Huffman coding
   (b) stack implementation
   (c) queue implementation
   (d) traverse a cyclic graph

7. How many numbers are there between 99 and 1000, having at least one of their digits 7?　　(8%)

8. In a group of students, there are 6 boys and 4 girls. Out of 10 students, 4 students must be selected. Find out how many different ways the students can be selected such that at least one boy should be selected?　　(10%)

9. Simplify the expression $(x + y)(x + z)$ using the laws of boolean algebra.　　(10%)

10. (a) What is the remainder when 43^{86} is divided by 5?　　(8%)
    (b) What is the remainder when 75^{384} is divided by 97?　　(8%)

11. Suppose that a tree has ten vertices of degree 2, ten vertices of degree 3, ten vertices of degree 4, one vertex of degree 5, and its remaining vertices have degree 1. How many vertices does the tree have?　　(10%)

12. If a 20-digit ternary (0, 1, 2) sequence is randomly generated, what are the probabilities of the following two situations?
    (a) It has an even number of 1's.　　(8%)
    (b) It has an even number of 1's and an even number of 2's.　　(8%)