

# 國立臺北科技大學

105 學年第二學期電機系博士班資格考試

## 計算機概論(大學部)試題

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### 注意事項：

1. 本試題共【10】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

1. Solve each of the following problems by translating the values into two's complement notation (using patterns of 5 bits), converting any subtraction problem to an equivalent addition problem, and performing that addition. (Indicate if there is overflow.)
  - (a)  $(-9) - 8$  (5 points)
  - (b)  $9 + (-8)$  (5 points)
2. Summarize the difference between a CISC architecture and a RISC architecture. (10 points)
3.
  - (a) What is the similarity between deadlock and starvation? (5 points)
  - (b) What is the difference between deadlock and starvation? (5 points)
4.
  - (a) What problem arises as the lengths of the time slices in a multiprogramming system are made shorter and shorter? (5 points)
  - (b) What about as they become longer and longer? (5 points)

5. The Fibonacci numbers are defined as:  $F_0 = 0$ ,  $F_1 = 1$ , and  $F_i = F_{i-1} + F_{i-2}$  for  $i \geq 2$ . Develop two algorithms, one based on a loop structure (5 points) and the other on a recursive structure (5 points), to compute  $F_i$ .

6. (a) What is operator precedence? (5 points)

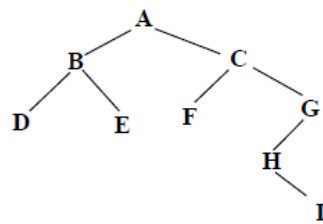
(b) Depending on operator precedence, what values could be associated with the expression  $7 + 3 \times 4$ ? (5 points)

7. Identify the trees below whose nodes would be printed in alphabetical order by the following algorithm.

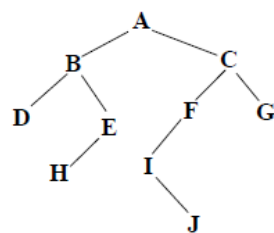
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procedure PrintTree (Tree)
  if (Tree is not empty)
    then ( Apply the procedure PrintTree to the tree that
            appears as the left branch in Tree;
            Apply the procedure PrintTree to the tree that
            appears as the right branch in Tree;
            Print the root node of Tree.)
  
```

(a) (5 points)



(b) (5 points)



8. Consider the relational database described in the following tables.

(a) Write a sequence of instructions (using the operations **SELECT**, **PROJECT** and **JOIN**) to retrieve the Name and JobTitle of each employee. (5 points)

(b) Answer the previous problem using **SQL**. (5 points)

**EMPLOYEE** relation

EmpId	Name	SSN
12X34	John Smith	111222333
45Y78	Tom Baker	123456789
13Z57	Bob Wang	222444666
...	...	...

**JOB** relation

JobId	JobTitle	Dept
3X	Secretary	Accounting
5Y	Secretary	Personnel
6Z	Manager	Sales
...	...	...

**ASSIGNMENT** relation

EmpId	JobId	StartDate
12X34	3X	3-1-2015
45Y78	6Z	8-1-2014
12X34	5Y	4-1-2015
...	...	...

9. (a) Briefly describe the Turing Test. (5 points)

(b) Briefly describe the Turing Machine. (5 points)

10 (a) What does it mean for a problem to be in NP-complete? (5 points)

(b) Give two examples of NP-Complete problems. (5 points)

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