


**注意：考試開始鈴響前，不得翻閱試題，
並不得書寫、畫記、作答。**

國立清華大學 108 學年度碩士班考試入學試題

系所班組別：音樂學系 甲組

考試科目(代碼)：電腦科學概論(7302)

— 作答注意事項 —

1. 請核對答案卷（卡）上之准考證號、科目名稱是否正確。
2. 作答中如有發現試題印刷不清，得舉手請監試人員處理，但不得要求解釋題意。
3. 考生限在答案卷上標記「由此開始作答」區內作答，且不可書寫姓名、准考證號或與作答無關之其他文字或符號。
4. 答案卷用盡不得要求加頁。
5. 答案卷可用任何書寫工具作答，惟為方便閱卷辨識，請儘量使用藍色或黑色書寫；答案卡限用 2B 鉛筆畫記；如畫記不清（含未依範例畫記）致光學閱讀機無法辨識答案者，其後果一律由考生自行負責。
6. 其他應考規則、違規處理及扣分方式，請自行詳閱准考證明上「國立清華大學試場規則及違規處理辦法」，無法因本試題封面作答注意事項中未列明而稱未知悉。

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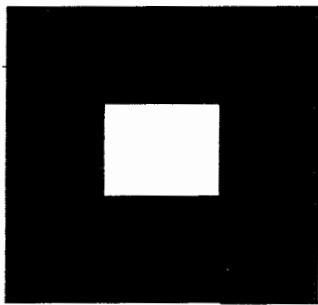
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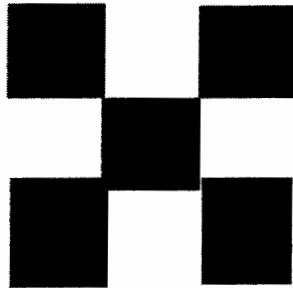
共__3__頁，第__1__頁 *請在【答案卷】作答

1. A perceptron unit has an input weight corresponding to each of its input (which can be either 0 or 1) and will output 1 if the overall weighted sum of inputs be greater than or equal to a threshold, otherwise outputs 0. Design a perceptron model using a three-by-three (3x3) input to distinguish the following two patterns (a) and (b) (each dark square cell represents a sensor input as 1 or 0), justify your design. (10%)

(a)



(b)



2. a. An integer number N , $N = 1 \pmod{5}$, $N = 2 \pmod{7}$, $N = 3 \pmod{11}$ respectively, what is **the second smallest** positive interger for N ? (10%)
- b. Find in the following list of numbers that produce the sum of 3023: (10%)
624, 57, 1541, 771, 2184, 388, 391, 782, 2206, 304
- c. Design a public key encryption system based on the list
2 3 6 12 14 and the fact that 30 and 38 are multiplicative inverses in modular system with modular 67. (10%)
3. Network routing has different types. How does static routing differ from dynamic routing? When will you use static routing? When will you use dynamic routing? (10%)

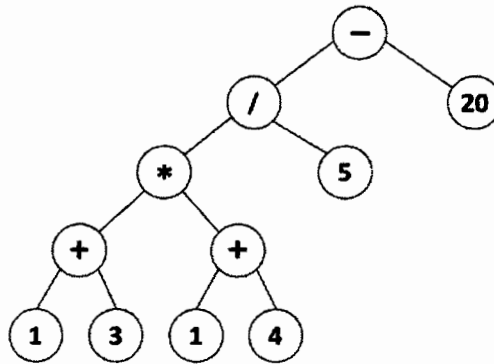
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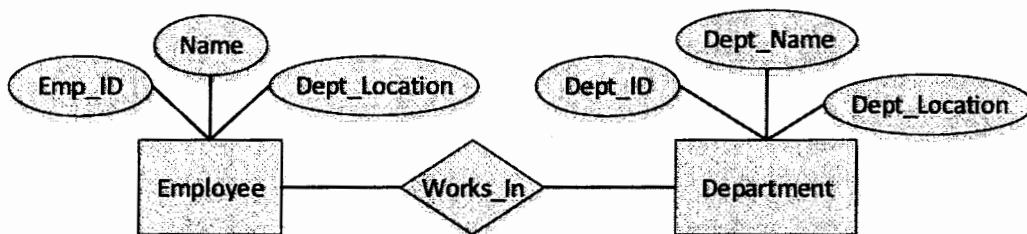
共 3 頁，第 2 頁 *請在【答案卷】作答

4. Answer the questions based on the following tree. (10%)



- a) [5%] Which binary tree traversal method can derive an infix expression? Write down this infix expression (Hint: Remember to add proper parentheses for clarification.)
- b) [5%] Which binary tree traversal method can derive a postfix expression? Write down this postfix expression.

5. Consider the following ER model fragment (10%):



- c) (6%) Convert this ER model into relational model.
- d) (4%) Which normal form does this model violate? State your reasons.
6. Is $2n+1=O(2n)$? Is $22n=O(2n)$ (Note that you should reason your answers) (10%)

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共__3__頁，第__3__頁 *請在【答案卷】作答

7. Describe and explain the kernel components in Operating System.
(10%)

8. Modern computers can be considered as Von Neumann machines.
Explain the major concepts of von Neumann architecture. (10%)