國 立 臺 北 科 技 大 學

九十七學年第一學期電機系博士班資格考試

積體電路實體設計演算法試題

注意事項：

1. 本試題共【7】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. Design CMOS logic gates for the function $F = ((A+B)CD)'$. (10%)

2. Elmore model is widely used in the field of physical design.
   (a) What is this model used to evaluate? (5%)
   (b) Briefly describe the principle of Elmore model. (5%)

3. (a) What is the difference between a spanning tree and a Steiner tree? (5%)
   (b) Is there any routing tool that can really optimize the routing of multiple-pin nets? Explain your answer. (5%)

4. (a) Describe the principle of Lee's algorithm (maze routing). (10%)
   (b) Label the grids and draw the routing path after performing Lee's algorithm on a 5×5 grids with an obstacle (colored black), where the start grid (S) and target grid (T) are respectively located at (0, 1) and (4, 4) . (10%)
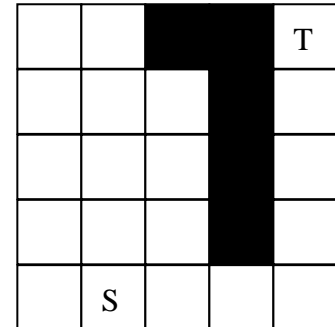
5. Function factorial(int n) is used to calculate the factorial of an integer, the prototype of this function is shown below.

       int factorial(int n);

   (a) Write the function factorial(int n) in recursive style. (10%)
   (b) Write the function factorial(int n) in dynamic programming style.(10%)

6. Given the following Polish expression $E = 12H3V45HVV6$,
   (a) Does the above expression satisfy the balloting property? Justify your answer. (10%)
   (b) Is E a normalized Polish expression? If not, change an operator and its adjacent operand to transform E into a normalized Polish expression E'. (10%)

7. Each element in an array $A[4][8]$ is painted with one of five patterns (as shown below), if you want to perturb this array using simulated annealing (SA) algorithm such that the elements of the same pattern are neighbored (connected),

   (a) How will you perform the perturbation ? (5%)

   (b) How will you express your cost function? (5%)