

國立臺北科技大學

一百零四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

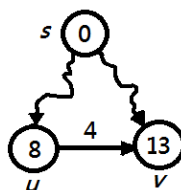
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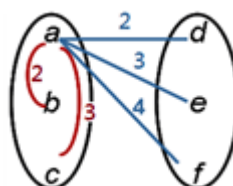
注意事項：

1. 本試題共【8】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. (a) What is the difference between a spanning tree and a Steiner tree? (5%)
(b) What is the Manhattan distance between (5, 3) and (4, 2)? (5%)
(c) How to decide the initial temperature when applying SA algorithm? (5%)
(d) For the graph shown below, what is the result of relaxation if we want to find the shortest path? (5%)



2. Based on KL partitioning algorithm,
 - (a) For the connection as shown, what is the D-value of vertex *a*? (6%)
 - (b) What is the External cost and Internal cost of vertex *a*, respectively? (4%)



3. Elmore model has been 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%)

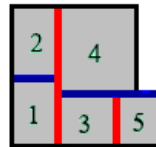
4. Design CMOS logic gates for the function $F = AB+C$. (10%)

5. (a) A typical formula for calculating cost function of a floorplan is shown below, what does A , λ , and W respectively mean? (5%)

$$Cost = A + \lambda \times W$$
 - (b) Sometimes we use the formula as shown below to calculate the cost function of a floorplan, explain what does A , W , α , A_{norm} , and W_{norm} mean, respectively. (5%)

$$Cost = \alpha \times A / A_{norm} + (1 - \alpha) \times W / W_{norm}$$

6. Express the following floorplan in slicing tree and Polish expression respectively. (10%)



7. Given the following Polish expression $E = 12V3V45HH6V$,
 - (a) Does the above expression satisfy the balloting property? Justify your answer. (5%)
 - (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' . (5%)

8. (a) Explain how does Lee's (or maze routing) algorithm perform "WAVE PROPAGATION". (10%)
 - (b) Label the grids 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 (1, 1) and (3, 4). (10%)

