

國立臺北科技大學

一百零三學年第二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

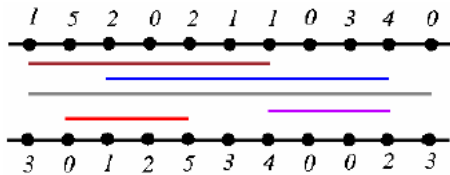
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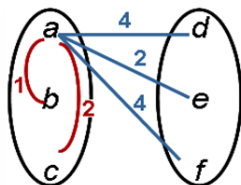
注意事項：

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) Give an example of “hypergraph”. (5%)
(b) What does “relaxation” mean when finding the shortest path of a DAG? (5%)
(c) What does $e^{-\frac{\Delta c}{T}}$ mean in Simulated Annealing algorithm? (5%)
(d) For the following routing problem, draw its Horizontal Constraint Graph (HCG). (5%)



2. Based on KL partitioning algorithm,
(a) For the connection as shown below, what is the D-value of vertex a? (5%)
(b) Why is KL algorithm a “balanced” partitioning heuristic? (5%)



3. Elmore model has been widely used in the field of physical design.

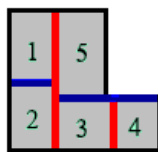
- (a) What is this model used to evaluate? (5%)
- (b) Briefly describe the principle of Elmore model. (5%)

4. Design CMOS logic gates for the function $F = (A+BC)'$. (10%)

5. A typical formula for calculating cost function of a floorplan is shown below, what does A, λ , and W respectively mean? (10%)

$$\text{Cost} = A + \lambda W$$

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



7. Given the following Polish expression $E = 12H3V45HH6V$,

- (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) Describe the principle of Lee's algorithm (or maze routing). (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 (4, 4) and (0, 1). (10%)

