

# 國立臺北科技大學

一百零六學年第二學期電機系博士班資格考試

## 高等數位影像處理 試題

第一頁 共二頁

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### 注意事項：

1. 本試題共【6】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。
5. 可以使用計算器(計算機)

1. (50%) Consider a 4-bit 8x8 figures as follows.

|   |   |   |   |   |   |    |   |
|---|---|---|---|---|---|----|---|
| 2 | 2 | 1 | 1 | 1 | 0 | 0  | 7 |
| 2 | 0 | 2 | 1 | 1 | 1 | 10 | 2 |
| 1 | 2 | 1 | 0 | 0 | 8 | 0  | 0 |
| 0 | 1 | 1 | 0 | 9 | 1 | 2  | 2 |
| 0 | 0 | 2 | 8 | 0 | 1 | 1  | 2 |
| 1 | 1 | 9 | 2 | 2 | 1 | 2  | 2 |
| 2 | 8 | 2 | 2 | 1 | 1 | 0  | 0 |
| 9 | 1 | 2 | 0 | 1 | 0 | 1  | 1 |

- (a) (10%) Plot the histogram by hand.
- (b) (10%) Perform histogram equalization on the figure.
- (c) (10%) Generate 4 bit-plane images.
- (d) (10%) Provide one smoothing spatial filter and show the result after applying it on the figure.
- (e) (10%) Provide one sharpening spatial filter and show the result after applying it on

the figure.

2. (10%) Describe the advantages and disadvantages of frequency filtering compared with spatial filtering.
3. (10%) Show the derivation of homomorphic system and filter function in detail.
4. (10%) Pre-color-component and vector-based processing are two categories of full-color image processing. Describe their definitions and properties in detail.
5. (10%) Explain the dilation and erosion effects of morphological image processing.
6. (10%) Describe the principals of watersheds for image segmentation.