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# Manipal Institute of Technology

(A Constituent Institute of Manipal University)

## II SEMESTER M. C. A.
## END SEMESTER EXAMINATION – APRIL/MAY 2016

SUBJECT: DIGITAL IMAGE PROCESSING [MCA - 5003]

14-05-2016

Time : 3 hours | Max. Marks : 50

**Instructions to Candidates**

1. Answer ANY FIVE FULL questions.
2. Missing data may be suitably assumed.

1A Define a Digital Image? Explain the key steps involved in Digital Image Processing.

1B Consider the two image subsets, $S_1$ and $S_2$, shown below.

For V={0,1}, determine whether these two subsets are:

i) 4-adjacent ii) 8-adjacent and iii) m-adjacent, justify your answer.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

$S_1$ $S_2$

1C What is Sampling and Quantization?

(5 + 3 + 2)

2A What is Histogram Equalization? Consider an image of size 64 x 64 and having 8-levels of intensity distribution shown below. Use PDF to compute and draw the equalized histogram and transformation function.

| $R_k$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| $N_k$ | 245 | 122 | 81 | 329 | 656 | 850 | 1023 | 790 |
| $P_r(R_k)$ | 0.06 | 0.03 | 0.02 | 0.08 | 0.16 | 0.21 | 0.25 | 0.19 |

2B What is Image Enhancement? Explain piecewise linear transformation function with example.

2C Define Region and Boundary of an Image

(5 + 3 + 2)

3A What do you mean by image filtering? Discuss the median filter with an example.

3B How do we find the frequency content of a signal? Explain image filtering using Laplacian kernel in a spatial domain.

3C Can you give the transformation function to create negatives? Justify.

(5 + 3 + 2)

4A Do you think Color is a prominent image component in object understanding? Mention the different types of color models available. Explain any one.

4B Give the importance of Chromaticity Diagram. Discuss its usefulness.

4C What is LOG operator? What is its use?

(5 + 3 + 2)

5A What is image segmentation? Mention the basic approaches of segmentation, explain any one technique in detail.

5B Write an algorithm used to obtain 'T' automatically for global thresholding.

5C What are meant by global and local thresholds?

(5 + 3 + 2)

6A What is meant by Dilation and Erosion operations? Giving their algorithms explain with the help of suitable example.

6B Does the region growing operation depend upon choice of seed region? How to choose the seed points.

6C Define Hit-or-Miss Transformation.

(5 + 3 + 2)