**ANIPAL INSTITUTE OF TECHNOLOGY** 

(A constituent unit of MAHE, Manipal)

# SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, DECEMBER - 2019

# SUBJECT: DIGITAL IMAGE PROCESSING [ICE 4021]

## TIME: 3 HOURS

#### MAX. MARKS: 50

### Instructions to candidates : Answer ALL questions and missing data may be suitably assumed.

- 1A. Illustrate the structure of image formation model. Give the significance of various levels in image processing.
- 1B. Discuss the sampling and quantization process with an example each.
- 1C. Write a short note on optical illusions.

(4+4+2)

- 2A. Describe the followings with an example,
  - i) Connectivity of pixels ii) Euclidean distance
- 2B. Apply the  $3 \times 3$  average mask using zero padding to an image shown below.
- 2C. Explain and compare histogram equalization and matching using suitable example.
- (3+3+4)

- 3A. Discuss any two order statistics filter with its advantage.
- 3B. Explain the following with relevant graphs,
  - i) Gray level slicing ii) Gamma correction
- 3C. With a neat block diagram, explain the steps involved in filtering approach that uses illumination-reflectance model in its operation.

(2+3+5)

- 4A. Explain any one method that addresses interpixel redundancy with an example.
- 4B. Describe loss-less predictive coding model with its processing stages.
- 4C. Encode the sequence  $a_1 a_2 a_3 a_3 a_4$  using following information.

Source Symbol	Probability
<i>a</i> <sub>1</sub>	0.2
$a_2$	0.2
$a_3$	0.4
$a_4$	0.2

(2+4+4)

5A. With mathematical formulation explain bottom-hat transformation.

5B. Explain segmentation scheme based on the colour and shape of an object.

5C. With a neat block diagram, explain the stages required to recognize the face automatically.

(2+4+4)

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