IANIPAL INSTITUTE OF TECHNOLOGY

Reg. No.



SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) **END SEMESTER DEGREE EXAMINATIONS, MARCH - 2021**

SUBJECT: Digital Image Processing [ICE 4021]

TIME: 3 HOURS

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

- 1A. With an example for each, explain the process of sampling and quantization.
- 1B. Define following terms: i) Pixel ii) Image negative
- 1C. What are the various processing levels in digital image processing? Give an example for each.
- 2A. For the given kernel (w) and image (f), compute the convolution of two.

1		2	1		Γ	0	0	0	0	
w =	-	-	2	f =	0	0	1	0	0	
	2	4			0	0	1	0	0	
	1	2	1		0	0	1	0	0	
1			_		0	0	0	0	0	

- 2B. Discuss the limiting effect of repeatedly subtracting Image 2 from Image 1. Assume that the results have to be represented in 8 bits.
- What is histogram matching? With an example compare histogram equalization and histogram 2C. specification.
- With the mathematical expressions explain harmonic and contra harmonic filter. Which type of 3A. degradation can be removed using these two techniques?
- Explain i) Sobel operators 3B. ii) Edge enhancement
- 3C. With an example, discuss averaging spatial filter with a box and Gaussian kernels.
- 4A. Compare subjective and objective fidelity criteria with a suitable example.
- What is entropy? Discuss its significance in medical image analysis. 4B.
- 4C. What are lossless compression techniques? Compute the Huffman coding for the following probability distribution. $A = \{0.4, 0.3, 0.1, 0.1, 0.06, 0.04\}$

(3+3+4)

(2+3+5)

(3+3+4)

- 5A. Explain detection of shape of an object in outdoor environment.
- Write about performing image matching using DFT. Illustrate with suitable example. 5B.
- Discuss advanced healthcare system which employs image processing algorithms. 5C.

(3+3+4)

MAX. MARKS: 50

(4+2+4)

19-03-2021