BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO /2023)

CLASS: BTECH **SEMESTER : V**
BRANCH: IT **SESSION : MO/2023**

SUBJECT: IT331 IMAGE PROCESSING

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Define a digital image and enumerate the fundamental steps in digital image processing.	[2]	CO1	1
Q.1(b)	Using an appropriate illustration, demonstrate the digital image formation model.	[3]	CO1	2
Q.2(a)	Estimate the number of bytes required to store a 2048x2048 image with 256 gray levels.	[2]	CO1	6
Q.2(b)	Discuss spatial resolution and demonstrate how enhanced spatial resolution can impact the level of visual details in an image.	[3]	CO1	6
Q.3(a)	Utilizing an appropriate diagram, demonstrate the process of applying a 3x3 Median filter to an image using spatial convolution.	[2]	CO1	2
Q.3(b)	If all of the pixels in an image are rearranged, will the histogram change? Apply histogram equalization on the image given below and sketch the histograms of the original image and the image that has been equalized.	[3]	CO1	3

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

Q.4(a)	Give a brief discussion on the extension of the Discrete Fourier Transform (DFT) to two-dimensional images. Enlist the properties of the two-dimensional Fourier transform.	[2]	CO2	6
Q.4(b)	Outline the primary function of image smoothing and the circumstances in which it is typically used. How does image sharpening in the frequency domain differ from spatial domain sharpening using convolution?	[3]	CO2	2
Q.5(a)	Summarize the key differences between image enhancement and image restoration.	[2]	CO2, CO3	2
Q.5(b)	Demonstrate the mathematical foundation of Discrete Cosine Transform (DCT) in the context of image processing. Enlist the similarities and differences between the DCT and DFT regarding their use in different image processing tasks.	[3]	CO2, CO3	2

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