

(2 1/2 Hours)

[Total Marks: 75]

- N.B. 1) All questions are compulsory.
 2) Figures to the right indicate marks.
 3) Illustrations, in-depth answers and diagrams will be appreciated.
 4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All (Each of 5Marks)

(15M)

(a) Multiple Choice Questions:

- 1 The transition between continuous values of the image function and its digital equivalent is called _____
 a) Quantisation
 b) Sampling
 c) Rasterisation
 d) None of the Mentioned
- 2 The mask shown in the figure below belongs to which type of filter?

	1	2	1
1 2	2	4	2
	1	2	1

- a) Sharpening spatial filter
 b) Median filter
 c) Sharpening frequency filter
 d) Smoothing spatial filter
- 3 Hit-or-miss transformation is used for shape _____.
 a) Removal
 b) Detection
 c) Extraction
 d) Hiding
- 4 Encoder is used for _____
 a) image enhancement
 b) image compression
 c) image decompression
 d) image equalization
- 5 Which of the following color model is used for color printing?
 a) RGB
 b) CMY
 c) CMYK
 d) CMY and CMYK

- (b) **Fill in the blanks:** ($s=clog_{10}(1+r)$, Brightness, Dynamic range, Robert, opening, $s=clog_{10}(1+r)$, band range, Contrast, closing, sobel, canny)
- The range of values spanned by the gray scale is called _____ range.
 - Erosion followed by dilation is called _____.
 - A gradient operator for edge detection is _____.
 - The difference in intensity between the highest and the lowest intensity levels in an image is _____.
 - _____ is the general form of representation of log transformation.

(c) **Short Answers:**

- What is the name of process used to correct the power-law response phenomena?
- The transformation $s = T(r)$ producing a gray level s for each pixel value r of input image. Then, if the $T(r)$ is satisfying $0 \leq T(r) \leq 1$ in interval $0 \leq r \leq 1$, what does it signifies?
- What do you mean by the term pixel depth?
- State True or False- Lossy Compression achieves greater compression.
- What do you mean image segmentation?

Q. 2 Attempt the following (Any THREE)(Each of 5Marks) (15M)

- Write a short note on Sampling and Quantization.
- The input matrix $x(m,n)$ and $h(m,n)$. Perform the linear convolution between these two matrices.
 $x(m,n)=\{1,2,3; 4,5,6; 7,8,9\}$ $h(m,n)=\{1,1; 1,1; 1,1\}$
- Differentiate between monochrome and grayscale image.
- Discuss Haar Transform.
- Give any five applications of image processing system.
- Write a short note on KL transform.

Q. 3 Attempt the following (Any THREE) (Each of 5Marks) (15M)

- What is Structuring Element? Discuss its usage in morphological operation?
- Write a short note on Gray Level slicing.
- Explain various techniques of image arithmetic.
- Discuss opening and closing morphological operation.
- Perform Histogram Equalization on Gray level distribution shown in the table.

Gray levels	0	1	2	3	4	5	6	7
No. of Pixels	0	0	0	6	14	5	0	0

- List and explain two types of classification of Color-Quantisation Techniques.

Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)

- (a) Obtain the Huffman code for the word 'COMMITTEE'.
- (b) Write a short note on Laplacian of Gaussian (LOG).
- (c) Discuss how Arithmetic coding is used in image compression?
- (d) Compare and contrast between inter pixel redundancy and coding redundancy.
- (e) How is thresholding used in image segmentation?
- (f) Explain- Region Splitting and Merging.

Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)

- (a) Explain 2D Line Impulse signal in detail.
 - (b) List and Explain limitations of the RGB Color Model.
 - (c) Compare lossy and lossless image compression.
 - (d) Explain Euclidean distance, City block distance, chess board distance.
 - (e) Write a short note on Slant Transform.
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