

(3 Hours)

[Total Marks: 80]

N.B. 1) Question No. 1 is compulsory.

2) Attempt any three out of remaining five questions.

3) Figures to the right indicate full marks.

4) Make suitable assumptions wherever necessary and justify them

- Q.1. a) Write a note on dynamic range compression. 4
- b) Find DTFT of $x(n) = \{1, 2, 3, 4\}$ 4
- c) Explain energy and power signal with examples. 4
- d) Write a note on distance measures. 4
- e) Explain Image segmentation. 4
- Q.2. a) Explain any 5 properties of Discrete Fourier Transform 10
- b) (i) Find the 4 point DFT of $x(n) = \{1, -1, 2, -2\}$ 10
- (ii) Find the IDFT of $X(k) = \{1, 0, 1, 0\}$
- Q.3. a) For $x(n) = \{1, 3, -1, 2, 0, 4\}$, plot the following discrete time signals 10
- (i) $x(n+2)$
- (ii) $x(-n-1)$
- (iii) $2x(n)$
- (iv) $x(n-1) \cdot \delta(n-3)$
- (v) $x(n) \cdot u(n-2)$
- b) (i) Find the cross correlation of the causal sequences 10
- $x(n) = \{1, 4, 7, 8\}$ and $y(n) = \{2, 0, 1, 3\}$
- (ii) Determine whether the following system is linear or non linear
- $y(n) = 4x(n) + 2$
- Q.4. a) Determine radix 2 DIT-FFT Flow graph for 10
- $x(n) = \{2, 2, 3, 1\}$
- b) Justify or Contradict 10
- (i) Point processing techniques are called as Zero memory operations
- (ii) To remove salt and pepper noise median filter is better than low pass filter

- Q 5. (a) Apply Horizontal and vertical line detection mask on the following 8 bits per pixel image F. Use appropriate threshold value. Assume virtual rows and Column by repeating border pixel values. 10

$$F = \begin{array}{|c|c|c|} \hline 10 & 15 & 10 \\ \hline 200 & 200 & 200 \\ \hline 5 & 20 & 10 \\ \hline \end{array}$$

- b) Explain Contrast stretching. Perform Contrast stretching on the following 4 bpp images 10

r1=4, r2= 9, s1= 2, s2 = 13

4 BPP IMAGE			
7	8	5	1
7	8	8	2
5	9	7	7
8	7	12	15

- Q 6. a) Write Short note on edge detection in detail 10

- b) What is a Histogram and what is histogram equalization. Perform Histogram Equalization on the following 3 bpp image. Calculate the new histogram. Plot the original and new histogram and show the new image. 10

5	0	7	7	1	4	5	2	0	1
7	5	6	2	5	3	4	3	2	5
4	3	6	2	7	3	2	4	3	5
7	4	4	1	6	4	3	7	7	4
3	2	5	1	1	1	1	5	4	0