

K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)

End Semester Exam
MAY-JUNE 2021

Max. Marks: 50

Duration: 1 Hr. 45 Min.

Class: TY B.Tech

Semester: VI

Name of the Course: **Digital Signal and Image Processing**

Branch: Computer

Course Code: **2UCC601**

Instructions:

- (1) **All questions are compulsory**
- (2) **Draw neat diagrams**
- (3) **Assume suitable data if necessary**

Question No.		Max Marks
Q1 (A)	<p>State True or False (1 Mark each)</p> <p>I. DCT is energy preserving Transform.</p> <p>II. Image segmentation does not depend on Illumination</p> <p>III. Image averaging can remove random noise.</p> <p>IV. Chain codes can be normalized.</p> <p>Multiple Choice Questions (2 M each)</p> <p>V. Given $x(n) = \sin((\pi/8) n^2)$ Find fundamental Period A) 18 samples B) 16 samples C) 10 samples D) 15 samples</p> <p>VI. Is the function $y[n] = x[n-1] - x[n-56]$ causal? A) The system is non causal B) The system is causal C) Both causal and non causal D) Anticausal</p> <p>VII. A pixel p at coordinates (x, y) has neighbors whose coordinates are given by: (x+1, y), (x-1, y), (x, y+1), (x, y-1) This set of pixels is called A) 4-neighbors of p B) Diagonal neighbors C) 8-neighbors D) M connectivity</p>	10

Q1 (B)	<p>Attempt any FIVE questions out of the following (any 5 out of 7)</p> <p>I. Show that High pass= Original –Low Pass</p> <p>II. Check whether $y(n) = n x(n)$ is linear or non-linear.</p> <p>III. Determine autocorrelation of the signal $x(n)=\{ \overset{\uparrow}{1},2,1,1 \}$</p> <p>IV. Justify if the energy of the signal is finite its power is zero</p> <p>V. Compute DFT of the given image using DIT-FFT:</p> <table><tr><td>0</td><td>1</td><td>2</td><td>1</td></tr><tr><td>1</td><td>2</td><td>3</td><td>2</td></tr><tr><td>2</td><td>3</td><td>4</td><td>3</td></tr><tr><td>1</td><td>2</td><td>3</td><td>2</td></tr></table> <p>VI. Explain Fidelity criteria</p> <p>VII. State any two properties of DFT.</p>	0	1	2	1	1	2	3	2	2	3	4	3	1	2	3	2	10
0	1	2	1															
1	2	3	2															
2	3	4	3															
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Q2	<p>Compare and contrast between the following(Any 2):</p> <p>I. Lossless and Lossy Compression</p> <p>II. Spatial domain and Frequency domain processing</p> <p>III. Segmentation based on discontinuities and Similarities</p>	10																
Q 3	<p>Generate Walsh Transform of given image</p> <table><tr><td>2</td><td>1</td><td>2</td><td>1</td></tr><tr><td>1</td><td>2</td><td>3</td><td>2</td></tr><tr><td>2</td><td>3</td><td>4</td><td>3</td></tr><tr><td>1</td><td>2</td><td>3</td><td>2</td></tr></table>	2	1	2	1	1	2	3	2	2	3	4	3	1	2	3	2	10
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Q4	<p>What is Morphology. Explain the basic operations in Morphology.</p> <p style="text-align: center;">OR</p> <p>Find the Arithmetic Codeword of the message INDIA.</p>	10																