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Code No. : 16237

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (C.S.E.) VI-Semester Main & Backlog Examinations, June-2022**Image Processing (PE-I)**

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B****Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO									
1.	Define Image Sampling & Quantization with an example?	2	1	1	1									
2.	Generally, image transmission is accomplished in packets consisting of start bit, a byte of information and a stop bit. How many minutes would it take to transmit a 1024x1024 Image with 256 intensity levels using 56 K baud modem?	2	2	1	2									
3.	Define image segmentation? Differentiate similarity and discontinuity in intensity of a given image.	2	1	2	1									
4.	Given a following image patch, find the value of central pixel after performing gamma correction (Gamma=1.25). <table border="1" style="margin: 10px auto;"> <tr> <td>50</td><td>55</td><td>70</td></tr> <tr> <td>60</td><td>65</td><td>75</td></tr> <tr> <td>80</td><td>90</td><td>95</td></tr> </table>	50	55	70	60	65	75	80	90	95	2	2	2	2
50	55	70												
60	65	75												
80	90	95												
5.	Show that Fourier Transform of the unit impulse located at origin is one.	2	2	3	2									
6.	Differentiate Low pass filters with high pass filters used in frequency domain?	2	2	3	2									
7.	Find the amount of data required to represent a three-hours HD TV movie using 1280 x 720 x 24 bit pixel arrays with video player must display the frames sequentially at rates near 30 fps (frames per second)?	2	2	4	2									
8.	Determine Golomb code for 12 with divisor 5 i.e., $G_5(12)$?	2	2	4	2									
9.	What is noise model? Explain Gaussian (normal) model with neat graph?	2	1	5	2									
10.	Convert the given pixel value (85,129,246) in RGB color model to CMY model.	2	2	5	2									
Part-B (5 × 8 = 40 Marks)														
11. a)	What are the components of image processing system and with the required diagram explain each component?	3	1	1	1									

Contd... 2

b)	<p>Consider the two image subsets, S1 and S2, shown in the following figure. For $V=\{1\}$, determine whether these two subsets are (a) 4-adjacent, (b) 8-adjacent, or (c) m-adjacent</p>	5	2	1	2																									
12. a)	<p>Explain Piecewise-Linear Transformation Functions using Bit-plane slicing with an example?</p>	4	1	2	1																									
b)	<p>What is histogram equalization? Determine the output image after applying histogram equalization to the following given image?</p>	4	3	2	3																									
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13. a)	<p>Obtain the smoothed image by applying Ideal and Butterworth lowpass filter for the given input image.</p>	4	3	3	3																									
$f(x, y) = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 4 & 0 \end{bmatrix}$																														
b)	<p>Given the input sample set $\{f(x)\} = \{2,3,4,4\}$, of a continuous function $f(t)$ taken at $x = (0,1, 2, 3)$. Compute the DFT for the input sample set.</p>	4	3	3	3																									
14. a)	<p>Compute compression ratio, relative redundancy, and entropy of following image.</p>	4	3	4	3																									
<table border="1"> <thead> <tr> <th>intensity</th> <th>probability</th> <th>Code1</th> <th>Code2</th> </tr> </thead> <tbody> <tr> <td>87</td> <td>0.25</td> <td>01010101</td> <td>01</td> </tr> <tr> <td>128</td> <td>0.47</td> <td>10000000</td> <td>1</td> </tr> <tr> <td>186</td> <td>0.25</td> <td>10111010</td> <td>000</td> </tr> <tr> <td>255</td> <td>0.03</td> <td>11111111</td> <td>001</td> </tr> </tbody> </table>						intensity	probability	Code1	Code2	87	0.25	01010101	01	128	0.47	10000000	1	186	0.25	10111010	000	255	0.03	11111111	001					
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b)	<p>Given a five-symbol source $\{a, b, c, d, e\}$ with source probabilities $\{0.3, 0.4, 0.2, 0.08, 0.02\}$, compute the Huffman codes for the sources and encode the sequence 'cbebadabe'.</p>	4	3	4	3																									
15. a)	<p>What is restoration of an Image? Explain image degradation/restoration model with neat diagram?</p>	4	2	5	2																									

b)	Given HSI color pixel values (85degrees,0.8,0.5). Obtain its corresponding RGB pixel values.	4	3	5	2																																																																
16. a)	Define digital image processing? Explain its fundamental steps with neat block diagram?	3	1	1	2																																																																
b)	What is Region-Based Segmentation? Apply region growing on the following image patch with seed point as 6 and threshold value as 3?	5	3	2	3																																																																
<table border="1"> <tr><td>5</td><td>6</td><td>6</td><td>7</td><td>6</td><td>7</td><td>6</td><td>6</td></tr> <tr><td>6</td><td>7</td><td>6</td><td>7</td><td>5</td><td>5</td><td>4</td><td>7</td></tr> <tr><td>6</td><td>6</td><td>4</td><td>4</td><td>3</td><td>2</td><td>5</td><td>6</td></tr> <tr><td>5</td><td>4</td><td>5</td><td>4</td><td>2</td><td>3</td><td>4</td><td>6</td></tr> <tr><td>0</td><td>3</td><td>2</td><td>3</td><td>3</td><td>2</td><td>4</td><td>7</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>2</td><td>2</td><td>5</td><td>6</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>3</td><td>4</td><td>4</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>2</td><td>3</td><td>5</td><td>4</td></tr> </table>						5	6	6	7	6	7	6	6	6	7	6	7	5	5	4	7	6	6	4	4	3	2	5	6	5	4	5	4	2	3	4	6	0	3	2	3	3	2	4	7	0	0	0	0	2	2	5	6	1	1	0	1	0	3	4	4	1	0	1	0	2	3	5	4
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17.	Answer any <i>two</i> of the following:																																																																				
a)	Find the effect of Max, Min, and average filter of size 3x3 on the given Image	4	3	3	3																																																																
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b)	Address spatial redundancy for the following data set using LZW Coding.	4	3	4	3																																																																
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c)	Explain the Pseudo color image processing with neat diagram?	4	2	5	3																																																																

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	34%
iii)	Blooms Taxonomy Level – 3 & 4	46%
