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Code No. : 17646 S O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

Accredited by NAAC with A++ Grade

**B.E. (I.T.) VII-Semester Supplementary Examinations, May/June-2023**

**Digital Image and Video Processing**

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.	What is meant by sampling and Quantization in image digitization process?	2	1	1	1																																			
2.	Find out the complement for the following grey level image. <table border="1" style="margin: 10px auto;"> <tr><td>1</td><td>4</td><td>2</td></tr> <tr><td>6</td><td>8</td><td>10</td></tr> <tr><td>5</td><td>12</td><td>9</td></tr> </table>	1	4	2	6	8	10	5	12	9	2	2	1	1																										
1	4	2																																						
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3.	What is a Histogram? Give an example	2	1	2	1																																			
4.	Apply Linear smoothing filter on the following Image and show the result. <table border="1" style="margin: 10px auto;"> <tr><td>40</td><td>45</td><td>50</td></tr> <tr><td>35</td><td>30</td><td>25</td></tr> <tr><td>50</td><td>30</td><td>20</td></tr> </table>	40	45	50	35	30	25	50	30	20	2	1	2	1																										
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5.	List the different types of segmentation approaches and their differences	2	1	3	1																																			
6.	What is the significance of Zero crossing in Gradient second order Derivative.	2	1	3	1																																			
7.	Find out the compression ratio, if run length code is used for the following Image? <table border="1" style="margin: 10px auto;"> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	2	2	4	1
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8.	What is the basic difference between MPEG and H.26X Video coding standards	2	2	4	1																																			
9.	Define Inter – frame redundancy and Intra frame redundancy.	2	1	5	1																																			

10.	Perform Erosion operation on the following Image	2 2 5 1																														
	<b>Part-B (5 × 8 = 40 Marks)</b>																															
11. a)	Define 4 and 8 connectivity. Find out the 4 connectivity for V={1} & 8 connectivity for V={0} for the following image	4 2 1 1																														
	<table border="1"> <tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr> </table>	1	1	0	0	1	0	1	0	0	1	0	1	0	1	1	1	0	1	0	1	1	0	1	1	1	0	0	1	1	1	
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b)	With help of neat diagram explain various steps of Digital Image processing	4 1 1 1																														
12. a)	Consider the following image and perform i) Median & Maximum filters and show the results	4 2 2 1																														
	<table border="1"> <tr><td>20</td><td>25</td><td>35</td><td>45</td><td>50</td></tr> <tr><td>25</td><td>25</td><td>35</td><td>40</td><td>55</td></tr> <tr><td>60</td><td>55</td><td>50</td><td>45</td><td>45</td></tr> <tr><td>45</td><td>50</td><td>35</td><td>20</td><td>15</td></tr> <tr><td>40</td><td>20</td><td>10</td><td>10</td><td>05</td></tr> </table>	20	25	35	45	50	25	25	35	40	55	60	55	50	45	45	45	50	35	20	15	40	20	10	10	05						
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b)	For the following image perform Histogram equalization and draw the resultant image histogram	4 3 2 2																														
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5	10	15	5	10	10	2	7	No of pixels.																								
13. a)	Explain Hough transformation in image segmentation? Using Hough transformation show that the points (1, 1), (2, 2), (3, 3) are collinear	4 3 3 2																														
b)	What is Gradient operator? Discuss different Gradient operators in Edge detection	4 2 3 1																														
14. a)	Design a Code for the following string using LZW coding method <b>String:</b>	4 3 4 2																														
	1 0 0 0 0 1 1 0 1 1 1 1 1 0 0 1 1 1 1 0 1 0 1																															
b)	Consider the Probabilities of A =0.2 B =0.1, C= 0.3 & D=0.4. Find the code for the string 'CADB', Using Arithmetic encoding and decode the same	4 3 4 2																														



15. a)	Draw Block based hybrid encoder for video compression and explain.	4 2 5 1																																						
b)	Consider the following image and perform <b>Opening</b> operation <table border="1"> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table> Image <table border="1"> <tr><td>1</td><td>1</td><td>1</td></tr> </table> structuring Element	0	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1	1	1	1	0	0	0	0	0	0	1	1	1	4 3 5 2										
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16. a)	Find out i) city block distance and ii) chessboard distance for the following image <table border="1"> <tr><td>15</td><td>10</td><td>12</td><td>8</td><td>10</td><td>11</td><td>12</td></tr> <tr><td>11</td><td>10</td><td>13</td><td>15</td><td>15</td><td>14</td><td>15</td></tr> <tr><td>14</td><td>11</td><td>12</td><td>16</td><td>15</td><td>17</td><td>16</td></tr> <tr><td>11</td><td>10</td><td>11</td><td>11</td><td>15</td><td>14</td><td>14</td></tr> <tr><td>16</td><td>15</td><td>14</td><td>14</td><td>15</td><td>13</td><td>12</td></tr> </table>	15	10	12	8	10	11	12	11	10	13	15	15	14	15	14	11	12	16	15	17	16	11	10	11	11	15	14	14	16	15	14	14	15	13	12	4 3 1 2			
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b)	Perform Bit plane Slicing operation on the following Image. <table border="1"> <tr><td>7</td><td>5</td><td>3</td></tr> <tr><td>6</td><td>4</td><td>2</td></tr> <tr><td>0</td><td>1</td><td>3</td></tr> </table>	7	5	3	6	4	2	0	1	3	4 2 2 1																													
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17.	Answer any <i>two</i> of the following:																																							
a)	Describe different thresholding techniques in detail	4 2 3 1																																						
b)	Perform Closing operation on the following image. Image <table border="1"> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> </table> <table border="1"> <tr><td>1</td><td>1</td><td>1</td></tr> </table> structuring Element	0	1	1	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	0	1	0	1	0	0	1	1	1	4 3 4 2
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c)	How video Frames are classified? Explain each briefly.	4 2 5 1																																						

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	45%
iii)	Blooms Taxonomy Level – 3 & 4	35%

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