

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

May – June 2023

(B.Tech.) Program: Electronics and Telecommunication Engineering

Examination: TY Semester: VI

Course Code: EXC603 and Course Name: **Image Processing and Machine Vision**

Date: 17-05-2023

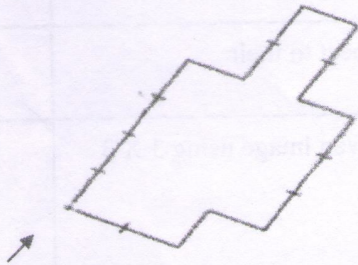
Duration: 2.30 Hours

Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level																									
Q 1	Solve any six questions out of eight.	12																											
i)	What do you mean by size of an image and resolution of an image? Explain with proper illustration.	2	1	U																									
ii)	Compare the high pass and low pass filters with respect to their Performance.	2	2	U																									
iii)	Compute the median value of the marked pixel in given image using 3 X 3 mask. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>0</td><td>5</td><td>4</td></tr> <tr><td>7</td><td>120</td><td>5</td></tr> <tr><td>4</td><td>3</td><td>7</td></tr> </table>	0	5	4	7	120	5	4	3	7	2	2	U																
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iv)	Compare the spatial domain filters and frequency domain filters used in Image restoration	2	4	U																									
v)	Describe opening and closing with proper illustration.	2	3	U																									
vi)	It is difficult to threshold a poorly illuminated image. State whether the statement is true or false and justify your answer	2	2	U																									
vii)	Explain the importance of image representation and description	2	5	U																									
viii)	Explain the classification principle for machine learning algorithm	2	6	U																									
Q.2	Solve any four questions out of six.	16																											
i)	Perform histogram equalization for the following image. Plot original and equalized histogram. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td></tr> <tr><td>3</td><td>4</td><td>5</td><td>4</td><td>3</td></tr> <tr><td>3</td><td>5</td><td>5</td><td>5</td><td>3</td></tr> <tr><td>3</td><td>4</td><td>5</td><td>4</td><td>3</td></tr> <tr><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td></tr> </table>	4	4	4	4	4	3	4	5	4	3	3	5	5	5	3	3	4	5	4	3	4	4	4	4	4	4	2	AP
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ii)	Explain any three types of point processing techniques and their applications with examples.	4	2	U																									
iii)	What do you understand by signatures? How they are used for image representation	4	5	U																									

iv)	What is the confusion matrix and how is it evaluated? Explain the significance	4	6	U																																																																
v)	Explain the basic block diagram for image enhancement in frequency domain	4	2	U																																																																
vi)	Explain hole filling morphological processing application with algorithm.	4	3	U																																																																
Q.3	Solve any two questions out of three.	16																																																																		
i)	Filter the following image using 3 X 3 neighbouring averaging by replicating the border <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1</td><td>2</td><td>3</td><td>2</td></tr> <tr><td>4</td><td>2</td><td>5</td><td>1</td></tr> <tr><td>1</td><td>2</td><td>6</td><td>3</td></tr> <tr><td>2</td><td>4</td><td>6</td><td>7</td></tr> </table>	1	2	3	2	4	2	5	1	1	2	6	3	2	4	6	7	8	2	AP																																																
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ii)	Find chain code, shape number for given left side image using 4 connectivity shown in right figure using clockwise direction. (Arrow shows starting point). 	8	5	AP																																																																
iii)	Explain the Hit Miss transform in detail with an example and mention the application	8	3	U																																																																
Q.4	Solve any two questions out of three.	16																																																																		
i)	Apply region splitting on following image. Assume the threshold value ≤ 3 . Show the final segmented image with different colours/ STYLES and also represent the segmentation using flow graph. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>5</td><td>6</td><td>4</td><td>7</td><td>4</td><td>5</td><td>5</td><td>3</td></tr> <tr><td>6</td><td>7</td><td>7</td><td>6</td><td>3</td><td>3</td><td>2</td><td>1</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>4</td><td>5</td><td>4</td><td>5</td><td>4</td><td>6</td><td>2</td><td>3</td></tr> <tr><td>3</td><td>2</td><td>3</td><td>0</td><td>7</td><td>5</td><td>3</td><td>2</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>2</td><td>2</td><td>6</td><td>5</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td><td>3</td><td>0</td><td>4</td><td>4</td></tr> <tr><td>0</td><td>2</td><td>1</td><td>0</td><td>2</td><td>3</td><td>5</td><td>4</td></tr> </table>	5	6	4	7	4	5	5	3	6	7	7	6	3	3	2	1	6	6	4	4	3	2	5	6	4	5	4	5	4	6	2	3	3	2	3	0	7	5	3	2	1	0	1	0	2	2	6	5	1	0	1	1	3	0	4	4	0	2	1	0	2	3	5	4	8	4	AP
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ii)	What is supervised and unsupervised classification? Explain with suitable example	8	6	U																																																																
iii)	Let $V = \{0,1\}$. Compute D_e , D_4 , D_8 and D_m distances between 2 pixels p and q shown in figure <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	8	1	AP																																																
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