

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2022

Program Name: BTECH CSE + (AIML, CSF, GG, CCVT, CSF, BDATA)
Course Name : Image Processing and Pattern Analysis
Course Code : CSEG3041P
Nos. of page(s) : 2

Semester : V
Time : 3 Hours
Max. Marks : 100

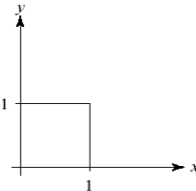
SECTION A

S. No.		Marks	CO
Q 1	Briefly describe a Simple Image Formation Model.	4	CO1
Q 2	Define unmask sharpening. Write different steps used.	4	CO1
Q 3	Write the set of morphological operations to extract the boundary on a binary image.	4	CO2
Q 4	What is the kernel's role in the support vector machine (SVM) classifier? Give one example of a kernel used in SVM.	4	CO4
Q 5	Discuss filter to find out second-order derivative of an image with example.	4	CO2

SECTION B

Note: Answer all the questions. Each question of section B carries 10 marks.

Q 6	<p>Consider the image shown below; Compute the equalized image with eight possible gray levels. Show each step carefully. Draw the histograms of the original and equalized images as well as the equalization transformation.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1</td><td>2</td><td>1</td><td>1</td><td>2</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>5</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>6</td><td>7</td><td>6</td><td>1</td><td>2</td></tr> </table>	1	2	1	1	2	0	0	1	5	1	0	1	1	6	7	6	1	2	10	CO1
1	2	1	1	2	0																
0	1	5	1	0	1																
1	6	7	6	1	2																
Q 7	<p>Find out the Fourier transform of a box function (as shown in Fig) of width T.</p>	10	CO3																		
Q 8	<p>Define convolution and correlation. Some 1-D signal f is given, apply the 1-D convolution and correlation operations on f using filter w where $f = 0\ 0\ 0\ 1\ 1\ 0\ 0$ and $w = 1\ 2\ 3\ 4\ 5$.</p>	4+6	CO3																		

<p>Q 9</p> 	<p>Why affine transformations are used in image processing? Apply the rotation (by 45 degree anti-clockwise) transformation on the image given below and show the transformed image with new coordinates.</p>	<p>4+6</p>	<p>CO3</p>
--	---	------------	------------

SECTION-C

<p>Q 10</p>	<p>For the following image A =</p> <pre> 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1 0 0 1 1 1 1 1 1 0 0 1 1 1 1 1 1 0 0 1 1 1 1 0 0 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 </pre> <p>And structuring element B =</p> <pre> 1 1 1 1 1 1 1 1 1 </pre> <p>Calculate and show the results of the following morphological operations</p> <ol style="list-style-type: none"> Erosion of A with B Dilation of A with B Opening of A with B Closing of A with B 	<p>4x5=20</p>	<p>CO2</p>
-------------	---	---------------	------------

<p>Q 11</p>	<p>Discuss the following algorithms with all steps involved.</p> <ol style="list-style-type: none"> HOG SHIFT Otsu's Thresholding <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> Discuss the problem of image segmentation? Explain two thresholding techniques with example. Discuss different steps involve in Canny edge detector with focus on hysteresis thresholding and non-maxima suppression. 	<p>6+6+8 OR 10+10</p>	<p>CO4</p>
-------------	--	-------------------------------	------------