

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2019**

**Programme Name: M. Tech Automation & Robotics Engineering**

**Semester : II**

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

**Time : 03 hrs**


**Course Code : ECEG 7004**

**Max. Marks : 100**

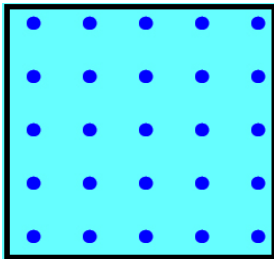
**Nos. of page(s) : 02**


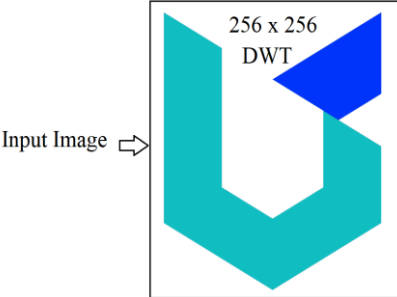
**Instructions: Assume any data in programming, if required**

**SECTION A (5 x 4 = 20 Marks)**

S. No.	Attempt <i>all</i> the questions	Marks	CO
Q 1	Distinguish between monochrome and grayscale image. You have a digital image that takes up 240 kB. The spatial resolution of the image is given by 600 x 200. What is bit depth?	5	CO1
Q.2	The fig.1 presents the edge enhancement of an image. What type of enhancement method can be employed in the image. Write the MATLAB script to support the functionality.   Fig.1	5	CO3
Q.3	Explain the concept of bit plain slicing and masking operation in image processing.	5	CO4
Q.4	What is the different between machine learning and artificial intelligence. Classify the machine learning algorithms.	5	CO5

**SECTION B (4 x 10 = 40 Marks)**

	Attempt <i>all</i> the questions		
Q.5	(a) Draw the detailed diagram of image processing system. (b) How image arithmetic is helping for image processing. Write the MATLAB/ SCILAB script for at least 5 operations of image arithmetics.	5 5	CO1
Q.6	How K- Means clustering is helping in predicting the score based on trained data and test data. Write the mathematical equations, algorithm and flow. Apply the same concept on the image given below and predict possible score if the cluster size is varying from 8, 16, 32, 64, 128 to 256 pixels.   Fig.2	10	CO5
Q.7	(a) Perform the histogram equalization of the image and plot the histogram.	6	CO2

	$\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$ <p>(b) Draw the block diagram of the automated pattern recognition system.</p>	4	
<b>Q.8</b>	<p>Apply the region splitting and merging technique for the image given below. Draw the quadtree for (8 x 8), 2D image. Explain the detailed operation to support your answer.</p>  <p style="text-align: center;">Fig. 3</p>	10	CO3
<b>SECTION-C (2 x 20 = 40 Marks)</b>			
Attempt any <i>two</i> of the followings			
<b>Q.9</b>	<p>(a) Classify the neural networks based on their architecture. Detail the perceptron training algorithm and functionality of BPN network.</p> <p>(b) How to obtain the image negative ? Explain the power law nonlinear transformation with example.</p>	15 5	CO5
<b>Q.10</b>	<p>(a) Consider a case of multiclustering image processing system (8 x 8). Explain the optimal routing scheme with the mathematical calculations about maximum availability and links.</p> <p>(b) Write the flow of optical character recognition-based machine vision system with example.</p>	10 10	CO4
<b>Q.11</b>	<p>(a) Explain the role of median filter in image processing and derive the mathematical expression for its behavior as low pass filter. Compute the value of the marked pixels shown in 3 x 3 mask.</p> $\begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & 128 & 24 & 172 & 26 & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{bmatrix}$ <p>(b) Detail the wavelet decomposition technique using HAAR wavelet. Consider 256 x 256 DWT and decompose the image shown in fig. till 2<sup>nd</sup> level.</p>  <p style="text-align: center;">Fig.4</p>	10 10	CO2

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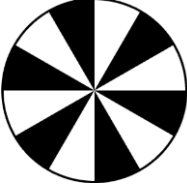
**Max.**

**Marks : 100**

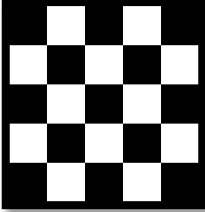
**Nos. of page(s) : 03**

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### SECTION A (5 x 4 = 20 Marks)

S. No.	Attempt <i>all</i> the questions	Marks	CO
Q.1	What is the different between machine learning and artificial intelligence. Classify the machine learning algorithms.	5	CO5
Q.2	Distinguish between monochrome and grayscale image. You have a digital image that takes up 240 kB. The spatial resolution of the image is given by 600 x 200. What is bit depth?	5	CO1
Q.3	The fig.1 presents the edge enhancement of an image. What type of enhancement method can be employed in the image. Write the MATLAB script to support the functionality.  <div style="text-align: center;">  </div> <p style="text-align: center;">Fig.1</p>	5	CO3
Q.4	Explain the concept of bit plain slicing and masking operation in image processing.	5	CO4

### SECTION B (4 x 10 = 40 Marks)

	Attempt <i>all</i> the questions		
Q.5	How K- Means clustering is helping in predicting the score based on trained data and test data. Write the mathematical equations, algorithm and flow. Apply the same concept on the image given below and predict possible score if the cluster size is varying from 8, 16, 32, 64, 128 to 256 pixels.  <div style="text-align: center;">  </div> <p style="text-align: center;">Fig.2</p>	10	CO5
Q.6	(a) Draw the detailed diagram of image processing system. (b) How image arithmetic is helping for image processing. Write the MATLAB/ SCILAB script for at least 5 operations of image arithmetic.	5 5	CO1



