Sample Question Format
(For all courses having end semester Full Mark=50)

KIIT Deemed to be University
Online End Semester Examination(Spring Semester-2021)

Subject Name & Code: Image Processing (IT-3033)
Applicable to Courses: B.Tech 6th semester

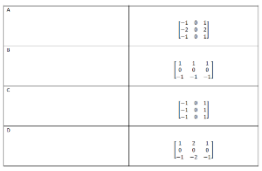
Full Marks=50 **Time:2 Hours**

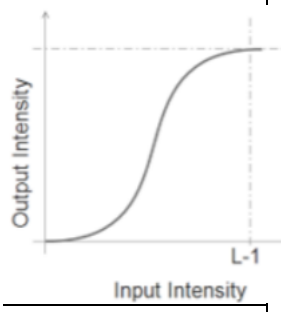
SECTION-A(Answer All Questions. Each question carries 2 Marks)

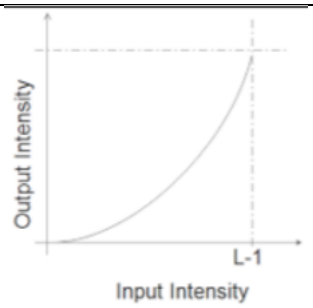
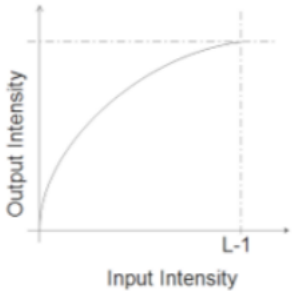
Time:30 Minutes **(7×2=14 Marks)**

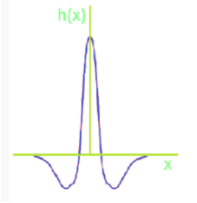
Question No	Question Type (MCQ/SAT)	Question	CO Mapping	Answer Key (For MCQ Questions only)
Q.No:1		Histogram matching is also called as a. Histogram equalization b. Contrast stretching c. Histogram specification d. None of these	CO3	c
		What is accepting or rejecting of certain frequency components in an image called as? a. Contrast stretching b. Intensity stretching c. Filtering d. None of the above	CO3	c
		In _____ image we notice that the components of histogram are concentrated on the higher side on intensity scale: a. Bright b. Dark c. Colourful d. All of the mentioned	CO3	a
		_____is used to emphasize high frequency	CO3	c

		components representing the image details without low frequency components representing the basic form of the signal. a. Low-Pass Filter b. High-Pass Filter c. High-Boost Filter d. Median Filter		
Q.No:2		sobel and prewitt operators are used for which of the following operations a. Contrast adjustment b. Edge detection c. Image averaging d. All of the above	CO3	b
		In a given image strip (s), assuming necessary zero padding find second order derivative s= 4 4 4 4 2 2 2 8 8 8 a. 0, -2, 0, -1, -2, 0, 6, -6, 8, 8 b. 0, 2, 0, 1, 2, 1, -6, 6, -8, 8 c. 2, -1, 0, 4, 8, 6, 12, 14, 6, 8 d. -4, 0, 0, -2, 2, 0, 6, -6, 0, -8	CO6	d
		Which one of the following is a major point of interest in discontinuity based algorithms? a. Isolated points b. Lines c. Edges d. All of the above	CO6	d
		Which of the following second order operator is most robust to noise in edge filtering? a. Sobel operator b. Laplacian operator c. Laplacian of Gaussian operator d. Prewitt operator	CO6	c
Q.No:3		Which of the following is used to extract the most appropriate location of an edge when there is a	CO6	b

		gradual change in intensity levels? a. Sobel operator b. Laplacian operator c. Prewitt operator d. All of these		
		Which of the following is(are) Sobel operator?  a. Only A b. Only C c. Both A and B d. Both A and D	CO6	d
		Identify the operator $\begin{bmatrix} 0 & -1 & 0 \\ -1 & 4 & -1 \\ 0 & -1 & 0 \end{bmatrix}$ a. Sobel edge operator b. Prewitt Edge operator c. Gradient operator d. Laplacian operator	CO6	d
		Where do we find the spectrum colours in the chromatic diagram? a. On boundaries b. Inside c. Outside d. All of the above	CO4	a
Q.No:4		Which of the following chromaticity coefficients are represented in the chromaticity diagram? a. Blue and green b. Red and blue c. Red and green d. Magenta and green	CO4	c
		If Red, Green, and Blue have values 158, 120, and 98 respectively and maximum intensity in RGB is 255, then its corresponding values in CMY (range 0 to 1) are a. c= 0.92, M= 0.12 and Y=0.21 b. c= 0.15, M= 0.19 and Y=0.97	CO4	d

		c. c= 0.17, M= 0.19 and Y=0.97 d. c= 0.38, M= 0.53 and Y=0.62		
		Which of the colour model is suitable from the perception point of view? a. RGB b. HSI c. CMY d. CMYK	CO4	b
		In chromaticity diagram which statement(s) is(are) true? **Statement 1:** Points on the boundary are fully saturated **Satatement 2:** As th point moves towards the equal energy, more white light is added to the colour and become less saturated **Statement 3:** Saturation at point of equal energy is zero a. Statement-1 b. Statement-2 c. Statement-3 d. All of the above	CO4	d
Q.No:5		Assume a colour image has light tone. What type of transformation should be used to correct the tone? a.  b.	CO4	b

		 c.  d. All of the above		
		Which of the following colours are pigment colour primaries? a. Magenta, Cyan, and Yellow b. Red, Green, and Blue c. Red, Green, and Cyan d. Red, Yellow, and Cyan	CO4	a
		Which of the following is the process of aligning two or more images of the same scene? a. Image restoration b. Image segmentation c. Image registration d. None of the above	CO5	c
		In which of the following application(s), image registration is used? a. Template matching b. Mosaicing c. Image fusion d. All of those	CO5	d
Q.No:6		Which of the following degradation model estimation method corresponds to blind convolution?	CO5	d

		a. By observation b. By experimentation c. Mathematical modelling d. All of these		
		The following equation corresponds to which of the following filter $H(u,v) = \frac{1}{1+\left[\frac{D_0}{D(u,v)}\right]^{2n}}$ where, n is a positive integer, Do is cut-off frequency a. Gaussian High Pass Filter b. Butterworth Low Pass Filter c. Gaussian Low Pass Filter d. Butterworth High Pass Filter	CO3	d
		In which of the following filter, the intensity at a particular point in the image, is a product of two terms, one is the illumination term, other one is the reflectance term is assumed? a. Laplacian Filter b. LOG c. Gaussian Filter d. Homomorphic Filter	CO3	d
		Which is the characteristic of the spatial domain filter given in following figure?  a. Low pass filter b. High pass filter c. Band pass filter **d.** None of these	CO3	b
Q.No:7		Match the following I. Butterworth low pass filter — (i) $H(u,v) = \begin{cases} 1 & \text{if } D(u,v) \le D_0 \\ 0 & \text{if } D(u,v) > D_0 \end{cases}$ II. Gaussian high pass filter — (ii) $H(u,v) = e^{-D^2(u,v)/2D_0^2}$ III. Ideal low pass filter — (iii) $H(u,v) = \frac{1}{1+[D(u,v)/D_0]^{2n}}$ IV. Gaussian low pass filter — (iv) $H(u,v) = 1 - e^{-D^2(u,v)/2D_0^2}$	CO3	b

		a. I-(i), II-(ii), III-(iii), IV-(iv) b. I-(iii), II-(iv), III-(i), IV-(ii) c. I-(ii), II-(iv), III-(iii), IV-(iv) d. I-(iii), II-(ii), III-(i), IV-(iv)		
		Which of the following filter does not produce ringing effect? a. Gaussian Low Pass Filter b. Ideal Low Pass Filter c. Low Pass Butterworth Filter of Higher Order d. None of these	CO3	a
		TO set the average value of an image zero, which of the following term would be set 0 in the frequency domain, where F(u,v) is Fourier transformed function of f(x,y)? a. F(0,1) b. F(1,0) c. F(0,0) d. All of the above	CO3	c
		Histogram equalization mainly used for which of the following purpose? a. Smoothing the image b. Blurring of images c. Enhancement of images d. All of the above	CO3	c

SECTION-B(Answer Any Three Questions. Each Question carries 12 Marks)

Time: 1 Hour and 30 Minutes **(3×12=36 Marks)**

Question No	Question	CO Mapping (Each question

		should be from the same CO(s))
Q.No:8	(i) Prove that the product of two orthogonal matrices is another orthogonal matrix. (ii) Consider the image segment shown. Let V={0, 1} and compute the lengths of the shortest 4-, 8-, and m-path between p and q. If a particular path does not exist between these two points, explain why. 3 1 2 1 (q) 2 2 0 2 1 2 1 1 (p) 1 0 1 2 (iii) Given the two images below, perform an enhancement operation to get Fig(I)  Fig (1) [4+3+5]	CO1
	Q.No:8-2nd question	
	(ii) (a) Give the condition(s) under which the D8 distance between two points p and q is equal to the shortest 4-path between these points. (b) Is this path unique? (iii) Perform histogram equalization for the 8x8 image shown below: Table 5.6 Image grey level distribution Grey levels (r_k) 0 1 2 3 4 5 6 7 Number of pixels (p_k) 8 10 10 2 12 16 4 2 [5 + 7]	
Q.No:9	Show that the Walsh transform works for the following image $\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$	CO2
	Prove that the Hadamard transform works for the following image: a. $\begin{pmatrix} 2 & 2 \\ 2 & 1 \end{pmatrix}$	
	Prove that the Hadamard transform works for the following image:	

	$\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$	
Q.No:10	**(i)** Let two of three Eigen values of a 3 × 3 matrix are −1 and 2 and if the determinant value equals 4. What is the third Eigen value? (ii) Explain discontinuity based segmentation with proper example. [2+10]	CO6
	Take a 10x10 image matrix and detect the horizontal edges using Sobel operator.	
	Take a 10x10 matrix and detect the horizontal edges using Prewitt operator.	
Q.No:11	What is the benefit of using Hough transform. Explain with proper example.	CO5
	What is the difference between image enhancement and restoration? With example show the process of image restoration. [4+8]	
	(i) Difference between Full colour processing and Psedu colour processing. (ii) Explain the quantities which describe the quality of light. (iii) What are the colour component for perception purpose and hardware perspective? [4+4+4]	