Enroll. No._____

MARWADI UNIVERSITY

Faculty of Technology

[COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY]

[B.TECH] SEM: 5 WINTER:2018

Subject: - (IMAGE PROCESSING) (01CE0507) **Date:-27/10/2018**

Total Marks:-100 **Time: - 03:00 hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1.

(a) Answer the following **[10]**

1. What is image?
a) Picture
b) Matrix of pixel
c) Collection of pixel
d) All of these

2. Power law transformation is useful in
a) Purification
b) Industry
c) Radar
d) MRI

3. To display image we need image in a
a) Spatial domain
b) Frequency domain
c) Algebraic domain
d) Both A and B

4. Process that expands range of intensity levels in image is called
a) Linear stretching
b) Contrast stretching
c) Color stretching
d) Elastic stretching

5. In power transformation values are dependent on value of
a) X-rays
b) Alpha
c) Beta
d) Gamma

6. Convolution in spatial domain is multiplication in
a) Frequency domain
b) Time domain
c) Spatial domain

d) Plane

7. The process of extracting information from the image is called as
a) Image enhancement
b) Image restoration
c) Image Analysis
d) Image compression

8. Which type of enhancement operations are used to modify pixel values according to the value of the pixels neighbors?
a) Point operations
b) Local operations
c) Global operations
d) Mask operations

9. In wiener filtering it is assumed that noise and image are
a) Different
b) Homogenous
c) Correlated
d) Uncorrelated

10. What is the name of area of the triangle in C.I E chromatic diagram that shows a typical range of colors produced by RGB monitors?
a) Color gamut
b) Tricolor
c) Color game
d) Chromatic colors

(b) Short Que. (answer in one sentence) [10]

1. What is the minimum number of bits required to store the image of size 1024×1024.
2. Define resolution.
3. Define Aspect ratio.
4. Explain Euclidean and city block distance with the help of examples.
5. Define – 4 and 8 Neighbors of a Pixel.
6. Describe the two important conditions for histogram equalization.
7. Write 3x3 mask for box filter and 2×2 Roberts cross gradient operators.
8. List some advantages of Power law and Log transformation.
9. Define foreground and background of an image?
10. List the various mathematical morphology operators.

Question: 2. Do as directed

(a) Explain sampling and quantization of an image with the help of diagram? [08]

(b) Solve the numerical for smoothing and sharpening using Laplacian mask with the help of following image and mask. . [08]

0	1	2
2	1	3
1	0	2

1	1	1
1	1	1
1	1	1

0	1	0
1	-4	1
0	1	0

(1) Input Image (2) Smoothing mask (3) Laplacian mask

OR

(b) Derive the mathematical expression for Gradient and Laplacian filter. Also write the mask matrix of Sobel operator for horizontal and vertical edges. [08]

Question: 3. Do as directed

(a) 100x100 pixel image is having 256 gray levels. What is the transmission rate required to transmit this image in one second? How much storage capacity is required to store image with size of 1024x768 and 256 gray levels. [08]

(b) Explain spatial linear filtering with the help of mask. [04]

(c) Explain image restoration and wiener filtering. [04]

OR

(a) Find out storage requirements in to store 100 true color images (24 bits per pixel) where each image has size of 1024x1024 pixels. What is transmission time required to transmit all these 100 images using internet speed 2 MBPS. [08]

(b) Explain the bit plane slicing for gray scale image and intensity slicing for color image. [04]

(c) Write the steps required for histogram equalization. Also differentiate between histogram specification and equalization. [04]

Question: 4. Do as directed

(a) Given image of 3 bit (l=8) of size 64*64 pixels has intensity distribution shown in table given below:

Rk: 0 1 2 3 4 5 6 7

Nk: 790 1023 850 656 329 245 122 81

Obtain values of equalized histogram for each r. [08]

(b) Differentiate between Spatial and Frequency domain? [04]

(c) Explain any four applications of image processing [04]

OR

(a) For the image given as follows find out equalize histogram [08]

1	**5**	**7**
2	**6**	**1**
1	**1**	**3**

(b) Explain linear and non-linear operations in image processing with the help of numerical examples. Also, explain about fundamental steps in digital image processing? [08]

Question: 5. . Do as directed

(a) Explain spatial correlation and convolution in depth. [08]

(b) Explain the basic steps involved in frequency domain filtering. [04]

(c) Explain additive and subtractive color models with one suitable example. [04]

OR

(a) What do you understand by dilution, erosion, image opening & closing operation in morphological image processing? Explain with the help of examples? [08]

(b) Give the MATLAB/SCILAB code for Image dilation and erosion [04]
(c) Explain the model of image degradation/ restoration process with the help of diagram? Also, write the formulation of any probability density function found in noisy image. [04]

Question: 6. . **Do as directed**

(a) Explain HSI color model with diagrams and write the mathematical expressions to convert color models from RGB to HSI and HSI to RGB. [08]
(b) Explain the smoothing and sharpening process in RGB color model in detail. [04]
(c) What is pseudo color image processing? Explain intensity slicing of color image. [04]

OR

(a) Explain the following morphological algorithms
(i) Boundary extraction ii) Hole filling [08]

(b) Explain Otsu thresholding and histogram based image segmentation in detail. [04]

(c) Explain the working of median filter on the following data. [04]

10	5	7	36	79	25	189	42	72	14	16	28	24

---Best of Luck---