Hall Ticket No: | | | | | | | | | | |

Question Paper Code: A3554

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech VI Semester Supplementary Examinations, May - 2022

(Regulations: VCE-R15)

IMAGE PROCESSING

(Common to Computer Science and Engineering & Information Technology)

Date: 28 May, 2022 FN **Time: 3 hours** **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks

Unit – I

1. a) Briefly explain basic components of a general purpose Image Processing System. ***8M***
   b) Briefly discuss the functionalities of perspective image transformation. ***7M***
2. a) Illustrate the basic relationships and distance measures between pixels in a digital image. ***8M***
   b) Explain the process of image sampling and quantization during image processing. ***7M***

Unit – II

3. a) Briefly discuss the features of Walsh theorem. ***8M***
   b) State and prove separability property of 2D-DFT. ***7M***
4. a) Explain Discrete Fourier Transform and its inverse. ***8M***
   b) Bring out the significance of Discrete Cosine Transform. List any four properties of Discrete Cosine Transform ***7M***

Unit – III

5. a) The histogram of the whole image value r ranging from 0 to 7 is given by: **9M**

r	0	1	2	3	4	5	6	7
h	2	4	5	2	3	3	3	3

   Use histogram equalization and arrive at the mapping of old ***r*** to new ***r*** and plot the corresponding new values of ***r***.

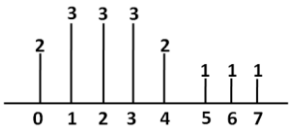
   b) How do you distinguish neighborhood operations from point operations? Explain how you will be able to smoothen an image in spatial domain using 3 X 3 Kernel? ***6M***

6. a) Compute the mean value and median value of the pixels of underlined numbers using 3 X 3 mask: ***6M***

18	22	33	25	32	24
34	<u>128</u>	24	<u>172</u>	26	23
22	19	32	31	28	26

   b) Consider the following 4x4 matrix of a 3-bit image, find histogram matching of this image using the following desired histogram. ***9M***

2	3	3	2
4	2	4	3
3	2	3	5
2	4	2	4



Unit – IV

7. a) With necessary expressions, explain the periodic noise reduction by frequency domain filtering with respect to notch filter. ***7M***
   b) In the image formation model how do you separate the low frequency and high frequency components? How is it applied in homomorphic filtering? ***8M***

Cont…2

8. a) Explain briefly ideal low-pass, ideal high-pass and band-pass filters. ***8M***

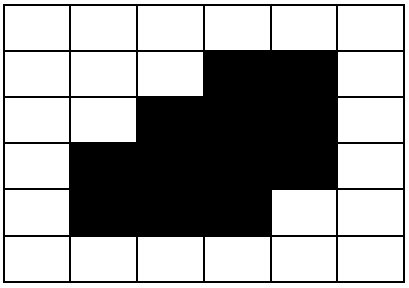
   b) What is the basic mathematical principle behind sharpening of an image in spatial domain? What are the effects of sharpening spatial on the images? What are the steps to get a noise free sharpened image using Laplacian? ***7M***

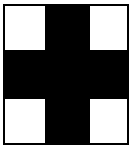
Unit – V

9. a) What are the effects of the dilation process? How can you detect boundary using morphological operations? ***8M***

   b) Discuss the steps involved in global thresholding algorithm. ***7M***

10. a) For the image given below and the 3X3 structuring element cantered in the mid pixel find the dilated and eroded image. ***8M***





   b) What are tristimulus values? Is it true that different portions of red, green, and blue can produce all the visible color? ***7M***