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

Question Paper Code: A3554

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous institute affiliated to JNTUH

B. Tech VI Semester, Supplementary Examinations December – 2021

(Regulations: VCE-R15)

IMAGE PROCESSING

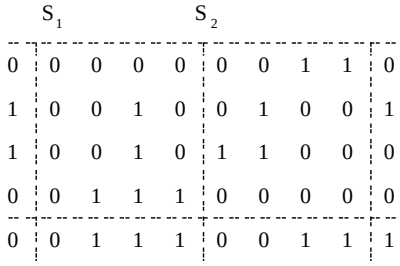
(Common to Computer Science and Engineering & Information Technology)

Date: 22 December, 2021 AN **Time: 3 hours** **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks

Unit – I

1. a) Consider the two image subsets, S_1 and S_2, shown in the following figure. For V = {1}, determine whether these two subsets are: ***8M***
   i. 4-adjacent
   ii. 8-adjacent
   iii. m-adjacent



   b) Give the condition(s) under which the distance between two points p and q is equal to the shortest 4-path between these points. Is this path unique? ***7M***

2. a) Discuss the following: ***7M***
   i. Euclidean distance
   ii. City-block distance
   iii. Chess board distance
   b) 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 points, explain why. ***8M***

   3 1 2 1 (q)
   2 2 0 2
   1 2 1 1
   (p) 1 0 1 2

Unit – II

3. a) State and prove the translation property. ***7M***
   b) Explain the properties of Haar transform. ***8M***

4. a) State Distributivity and scaling property. ***8M***
   b) Bring out the significance of Discrete Cosine Transform. List any four properties of Discrete Cosine Transform. ***7M***

Unit – III

5. a) Illustrate different steps in implementing histogram matching. ***8M***
   b) Justify the statement *"Histogram processing techniques are easily adaptable to local enhancement"*. ***7M***

6. a) What is bit-plane slicing? Illustrate the bit-plane representation of an 8-bit image. ***8M***
   b) Explain the functionalities of histogram equalization. ***7M***

Cont…2

Unit – IV

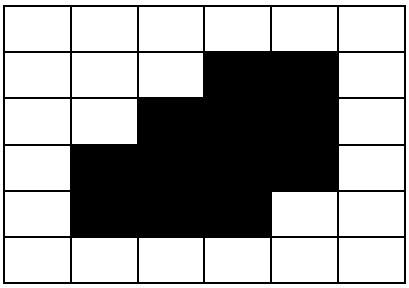
7. a) What are the steps for image filtering in frequency domain? Explain with a block diagram. ***10M***
   b) Write mathematical definition of Butterworth high pass filter and Gaussian high pass filter. ***5M***

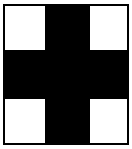
8. a) List the image filters for lowpass smoothing and briefly explain them. ***9M***
   b) Discuss briefly sharpening in the frequency domain. ***6M***

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***