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

Question Paper Code: A2435

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

An Autonomous institute affiliated to JNTUH

B. Tech VII Semester Supplementary Examinations, December - 2021

(Regulations: VCE-R14)

DIGITAL IMAGE PROCESSING

(Electronics and Communication Engineering)

Date: 23 December, 2021 FN **Time: 3 hours** **Max Marks: 75**

Answer ONE question from each Unit
All Questions Carry Equal Marks

Unit – I

1. a) Illustrate the block diagram and explain each block of the fundamental steps used in digital image processing. ***9M***
   b) Explain simple image model. ***6M***
2. a) Discuss the role of sampling and quantization with an example. ***7M***
   b) Consider the image segment. Let $V = \{0, 1\}$ and compute the lengths of shortest 4, 8 and m-path between p and q. if a particular path does not exist between p and q, explain why? ***8M***

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

Unit – II

3. a) Derive the 1-D walsh transform kernels table for N=4. ***8M***
   b) Give the formulation for determining DCT of an Image. List the properties. ***7M***
4. a) Find the 2D IDFT of $\begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$ ***6M***
   b) From Hadamard transform matrix for N=2 obtain Hadamard Matrix for N=4 and N=8. Comment on the sequency. ***9M***

Unit – III

5. a) What is meant by histogram? Explain histogram equalization with necessary derivations. ***7M***
   b) Discuss with relevant equations image smoothing in frequency domain by ideal low pass filter and Gaussian filter. ***8M***
6. a) Explain the following gray level transformations: ***8M***
      i. Log transformations
      ii. Power-law transformations
      iii. Contrast stretching
   b) Explain arithmetic and logical operations used image enhancement. ***7M***

Unit – IV

7. a) Discuss Wiener filtering. ***8M***
   b) Explain full-color image processing. ***7M***
8. a) Explain mean square error filtering. ***8M***
   b) Explain Pseudo-color image processing. ***7M***

Cont…2

Unit – V

9. a) Explain the following compression fundamentals: ***8M***
   i. Coding redundancy
   ii. Spatial and temporal redundancy
   iii. Irrelevant Information
   b) Explain Lossless predictive coding with block diagram. ***7M***

10. a) What is an edge? Explain how gradient and Laplacian operators are used in edge detection. ***7M***
   b) Explain region splitting and merging approach in region based segmentation. ***8M***