	Utech
Name:	
Roll No.:	A Descript Sample and Capitant
Invigilator's Signature :	

DIGITAL IMAGE PROCESSING

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

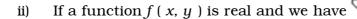
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

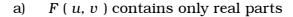
 $10 \times 1 = 10$

- i) An image is a 2D array of
 - a) Digital data
 - b) electrical signals
 - c) photographic objects
 - d) light signals.

8216 [Turn over



F(u, v) = 2DFFT[f(x, y)]

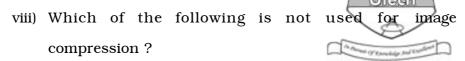


- b) F(u, v) contains only imaginary parts
- c) F(u, v) contains both real and imaginary parts
- d) None of these.
- iii) If a function f (x, y) is finite in the space domain, the Fourier transform of f (x, y) will be
 - a) finite

- b) infinite
- c) undefined
- d) zero.
- iv) A wavelet transform is a special case of
 - a) Laplace transform
 - b) Z-transform
 - c) Fourier transform
 - d) none of these.



- v) Representation & description almost always follow the output of a
 - a) Segmentation stage
 - b) Filtering stage
 - c) Compression stage
 - d) All of these.
- vi) Coloured Model Names
 - a) The RGB colour model
 - b) The CMY & CMYK colour models
 - c) The HSI colour model
 - d) (a) & (b) only
 - e) (a), (c) & (d).
- vii) The basic principle of compression matches the principle of
 - a) Channel coding
 - b) Line coding
 - c) Source coding
 - d) All of these.



- a) Block transfer coding
- b) Wavelet coding
- c) LZW coding
- d) Convolution coding.
- ix) is not a morphological image processing algorithm.
 - a) Thinning
 - b) Skeleton
 - c) Both (a) & (b)
 - d) None of these.
- x) Digital image processing uses
 - a) Fuzzy set theory
 - b) DFT
 - c) DCT
 - d) (b) & (c)
 - e) (a), (b) & (c).

- xi) Knowledge of which one of the following is not required for morphological image processing?
 - a) Erosion
 - b) Morphological reconstruction
 - c) Neural networking
 - d) Duality & dilation.
- xii) Find the odd one out w.r.t. DIP:
 - a) Arithmetic operation
 - b) Softwares
 - c) Vector & matrix operations
 - d) Image transforms.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- 2. Explain Unsharp masking and High boost filtering. Write the expression of Laplacian operator for an image of two variables. 3+2
- 3. If all the pixels of an image are shuffled, will there be any change in the histogram of that image? Justify your answer.

1 + 4

4. Explain bilinear interpolation method.

5

5. Explain the operation of a median filter.

5

6. Discuss briefly about the usefulness of discrete cosine transform.

GROUP - C

(Long Answer Type Questions)

Answer any three of the following.



- 7. a) What is Histogram of an image and why is it used for image processing? What do you mean by Histogram equalization?
 - b) What is the value of the marked pixel after a 5×5 median filtering?
 - 2 1 3 4 5
 - 1 1 0 2 3
 - 2 0 0 1 2
 - 5 1 2 3 1
 - 3 3 1 2 0
 - c) Briefly describe the smoothing linear spatial filtering. What is bit plane slicing method?
- 8. a) Describe Walsh transform.
 - b) What do you mean by global and local thresholding? What is the basic difference between region growing and split merge technique?
 - c) What is Hough transform and where is it used?
- 9. a) Discuss about threshold coding implementation.
 - b) Make a comparative study of least square restoration and constrained least square restoration methods.
 - c) Give one application of Wiener filter.

- 10. a) Discuss the global processing via the Hough transform.
 - b) Explain the role of Discrete cosine transform in image processing. 8 + 7
- 11. Write short notes on any *three* of the following: 3×5
 - a) Lossy compression
 - b) Constrained least squares
 - c) Hadamard transform
 - d) Colour image processing
 - e) Error-free compression.

8216 7 [Turn over