Total number of printed pages: 50 **Programme(UG)/7th/UCSE715**

2022

DIGITAL IMAGE PROCESSING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	**Answer the following questions:**		
	a)	**Fill in the blanks:**	1x8=8
		(i) The output intensity level (s) is low at the high value of input intensity value (r) for _____function. **(ii)** Salt noise can be handled by the _____filter. **(iii)** Low and high pass filter passes___ and ___frequencies respectively. **(iv)** Token table is generated in _____ compression. **(v)** Strictly monotonically is _____ and _____. **(vi)** Boundary points are connected in _____based image compression. **(vii)** Thinning operation of a set 'A' by SE 'B' is defined in terms of _____ transformation. **(viii)** In the hole filling morphological operation X_k=_____.	
	b)	**True or False:**	1x12=12
		(i) Mid level of processing is required for enhancing the image from the low contrast image. **(ii)** Dilation expands the size of foreground objects. **(iii)** Erosion closes holes and gaps. **(iv)** The boundary of set 'A' can be obtained using erosion. **(v)** Opening and closing operations are duals of each other. **(vi)** Harmonic mean filter is used to handle pepper noise. **(vii)** The DFT provide better continuity that the general DCT. **(viii)** WHT provide the least error at 16 sub-image size than FFT. **(ix)** FFT provide the least error at 16 sub-image size than WHT. **(x)** DCT provide the least error at almost any sub-image size. **(xi)** Contrast stretching is used for improving the quality low contrast image. **(xii)** High pass filter eliminates low frequencies and image becomes sharpen.	
2.	**a)**	Explain the spatial domain function S_k in continuous and discrete case for histogram equalization.	8
	b)	What is Hole filling? How it works?	6
	c)	Describe the thinning operation with the notations.	6
3.	**a)**	What kind of the redundancy issue in data?	3
	b)	How to define relative data redundancy?	4

	c)	What are types of redundancy in digital images?	9
	d)	Why the block size is very important in image compression method?	4
4.	**a)**	Explain three common pattern arrangements in detail.	9
	b)	What is decision theoretic method for the recognition?	3
	c)	Explain the decision theoretic method based on correlation matching.	4
	d)	Explain the structural method based on shape number matching.	4
5.	Write short notes on the following (***any four***):		4x5=20
	a)	Tonal correction	
	b)	Adaptive filters with formulation	
	c)	String matching (structural method)	
	d)	Fidelity Criteria	
	e)	Lossy predictive coding	
6.	Differentiate between the following (***any four***):		4x5=20
	a)	Opening and Closing (Morphological Operation)	
	b)	RGB and HSI color models	
	c)	Luminance and Brightness	
	d)	Syntactic Recognition of Strings and Trees	
	e)	Huffman coding and Arithmetic coding	