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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth to Seventh Semester

18CSE353T - DIGITAL IMAGE PROCESSING

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	What is the first and foremost step in Image Processing? (A) Image restoration (B) Image enhancement (C) Image acquisition (D) Segmentation	1	1	1
2.	1024 X 1024 image has resolution of (A) 1348576 (B) 1248576 (C) 1148576 (D) 1048573	1	2	1
3.	An image is considered to be a function of a(x,y), where a represents: (A) Height of image (B) Width of image (C) Amplitude of image (D) Resolution of image	1	1	1
4.	A pixel p at coordinates (x, y) has neighbors whose coordinates are given by:(x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1)This set of pixels is called (A) 4-neighbors of p (B) 8-neighbors (C) Diagonal neighbors (D) Column neighbors	1	2	1
5.	If s and r are the pixel values of the output and the input image and c is a constant, then formula for Logarithmic transformation is given as? (A) s = clog(255+r) (B) s = clogr (C) s = clog(r+1) (D) s = log(r)	1	2	2
6.	What is the sum of all components of a normalized histogram? (A) 1 (B) -1 (C) 0 (D) 10	1	2	2
7.	In linear spatial filtering, what is the pixel of the image under mask corresponding to the mask coefficient w (1, -1), assuming a 3*3 mask? (A) f (x, -y) (B) f (x+1, y) (C) f (x, y-1) (D) f (x+1, y-1)	1	2	2
8.	The output of a smoothing, linear spatial filtering is _____ of the pixels contained in the neighborhood of the filter mask. (A) Sum (B) Average (C) Dot Product (D) Product	1	1	2
9.	Gradient computation equation is ---------- (A) |Gx|-|Gy| (B) |Gx|/|Gy| (C) |Gx|X|Gy| (D) |Gx|+|Gy|	1	2	3
10.	Band reject filters are used where the noise components are usually (A) Known (B) Unknown (C) Taken (D) Reject	1	1	3

11.	Gaussian Noise is referred to as (A) red noise (B) white noise (C) normal noise (D) black noise	1	1	3
12.	Power spectra and noise of undegraded image must be known as (A) Notch filter (B) Wiener filter (C) Band pass filter (D) Band Reject filter	1	1	3
13.	Which of the following is the abbreviation of JPEG? (A) Joint Photographs Expansion Group (B) Joint Photographic Experts Group (C) Joint Photographic Expanded Group (D) Joint Photographic Expansion Group	1	1	3
14.	In the formula 1-(1/c), C is the (A) complex ratio (B) compression ratio (C) constant (D) condition	1	2	4
15.	Image compression comprised of (A) Encoder (B) Decoder (C) Frames (D) Both Encoder and Decoder	1	2	4
16.	Formula pr = n/MN represents the (A) coding redundancy (B) spatial redundancy (C) temporal redundancy (D) irrelevant info	1	2	4
17.	Based on the 4-directional code, the first difference of smallest magnitude is called as: (A) Shape number (B) Chain number (C) Difference (D) Difference number	1	2	5
18.	Which of the following technique of boundary descriptions has the physical interpretation of boundary shape? (A) Fourier transform (B) Statistical moments (C) Laplace transform (D) Curvature	1	2	5
19.	Which of the following measures are not used to describe a region? (A) Mean and median of grey values (B) Minimum and maximum of grey values (C) Number of pixels alone (D) Number of pixels above and below mean	1	2	5
20.	What is the order of the shape number of a rectangular boundary with the dimensions of 3×3? (A) 3 (B) 6 (C) 9 (D) 12	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Draw one example for 4-adjacency and 8-adjacency and briefly explain.	4	3	1
22.	Illustrate the following transformations 1. Log transformation [2 marks] 2. Power law transformation [2 marks]	4	2	2
23.	Compare the following noise models 1. Gaussian noise [2 marks] 2. Salt and pepper noise [2 marks]	4	4	3
24.	Differentiate the following coding techniques 1. Lossy predictive coding [2 marks] 2. Run Length coding [2 marks]	4	4	4

		Marks	BL	CO
25.	Describe Fourier descriptors	4	2	5
26.	What are the coding systems in JPEG?	4	2	3
27.	Give the relation for the following with an example 1. Impulse noise [2 marks] 2. Gamma noise [2 marks]	4	2	3

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) How is an image quantized? Explain. What is the effect on the image quantization levels if it is reduced?	12	2	1
	(OR)			
	(b) Describe the following 1. 4-adjacency [3 marks] 2. 8-adjacency [3 marks] 3. m-adjacency [3 marks] 4. Euclidean distance [3 marks]			
29.	(a) Explain gray level transformations in Digital Image Processing with an example	12	2	2
	(OR)			
	(b) Describe Histogram equalization with a sample input image			
30.	(a) Derive a Weiner filter for image restoration and specify its advantages over inverse filter.	12	3	3
	(OR)			
	(b) How do you perform Watershed segmentation algorithm and list out its applications.			
31.	(a) Encode the message BCCABBDDAECCBBAEDDCC using Huffman coding and calculate the final bits	12	3	4
	(OR)			
	(b) Encode the following using Arithmetic coding message: went. Probability : e - 0.3, n-0.3, t-0.2, w-0.1, .-0.1			
32.	(a) Explain about Polygonal approximation with an example	12	2	5
	(OR)			
	(b) Write short notes on the following 1. Signatures [6 marks] 2. Boundary segments [6 marks]			

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