Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2024

Fifth to Seventh Semester

18CSE353T – DIGITAL IMAGE PROCESSING

(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

ote:
(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 & Part - C** should be answered in answer booklet.

ime: 3 hours — Max. Marks: 100

	Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. In what ways does image production in the eye differ from that of a camera? — 1 | 1 | 1 | 1
   (A) Fixed focal length
   (B) Varying distance between lens and imaging plane
   (C) Variable focal length
   (D) No difference variable focal length

2. Which of the following techniques can be used to lessen the aliasing impact on an image? — 1 | 2 | 1 | 1
   (A) By reducing the high-frequency components of image by clarifying the image
   (B) By increasing the high-frequency components of image by clarifying the image
   (C) By increasing the high-frequency components of image by blurring the image
   (D) By reducing the high-frequency components of image by blurring the image

3. The change from the picture functions continuous values to their digital counterpart is referred to as — 1 | 2 | 1 | 1
   (A) Quantization
   (B) Sampling
   (C) Rasterization
   (D) Unmasking

4. If a path connecting two points in a subset of pixels S, is said to be _____ if all of the pixel on the path are in S — 1 | 2 | 1 | 1
   (A) Continuous
   (B) Connected
   (C) Ambiguous
   (D) Disjoint

5. Which of the following transformation is dealt with by the basic function power-law using gray-level transformation? — 1 | 1 | 2 | 2,3
   (A) Negative and identity transformations
   (B) Log and inverse-log transformations
   (C) n^{th} and n^{th} root transformations
   (D) Negative and positive transformations

6. When applying a smoothing filter to an image, which of the following eliminated? — 1 | 2 | 2 | 2,3
   (A) Smooth transitions of gray levels
   (B) Smooth transitions of brightness levels
   (C) Sharp transitions of brightness levels
   (D) Sharp transitions of gray levels

7. What is the proper way to illustrate log transformation among these options? 1 1 2 2,
   (A) S = C log 10 (1/r)
   (B) S = C log 10 (1+r)
   (C) S = C log 10 (1–r)
   (D) S = C log 10 (1*r)

8. Which filter given below weakens an images high frequencies while allowing its low frequencies to get through? 1 2 2 2,3
   (A) Unsharp mask filter
   (B) Zero-phase-shift filter
   (C) Low pass filter
   (D) High pass filter

9. Salt and pepper noise can interchangeably be used with 1 1 3 2
   (A) Black noise
   (B) Rayleigh noise
   (C) Impulse noise
   (D) Gamma noise

10. Band reject filters are used where the noise components are usually 1 2 3 2
   (A) Known
   (B) Unknown
   (C) Taken
   (D) Reject

11. Gradient computation equation is 1 1 3 2
   (A) $|Gx|-|Gy|$
   (B) $|Gx|/|Gy|$
   (C) $|Gx|*|Gy|$
   (D) $|Gx|+|Gy|$

12. The approximation of the second derivative states that it is nonzero at only 1 2 3 2
   (A) Step
   (B) Onset
   (C) Ramp
   (D) Edges

13. If the $P_{(E)}=1$, it means event 1 2 4 1
   (A) Always occur
   (B) Does not occur
   (C) No probability
   (D) Normalization

14. Which of the following is the example of lossless compression? 1 1 4 2
   (A) JPEG
   (B) MPEG
   (C) BMP
   (D) RLE

15. In Huffman coding, data in a tree always occur? 1 2 4 2
   (A) Roots
   (B) Leaves
   (C) Left sub trees
   (D) Right sub trees

16. Suppose storing an image made up of a square array of 256×256 pixels requires 65,536 bytes. The image is compressed and the compressed version requires 16,384 bytes. Then the compression ratio is 1 2 4 2
   (A) 1:4
   (B) 3:1
   (C) 4:1
   (D) 2:1

17. What boundary description technique has the physical interpretation of the border shape among the following? 1 1 5 2
   (A) Laplace transform
   (B) Fourier transform
   (C) Curvature
   (D) Statistical moments

18. The line that travels perpendicular to the main axis is defined by boundaries? 1 1 5 2
   (A) Equilateral axis
   (B) Equidistant axis
   (C) Minor axis
   (D) Median axis

19.	What method is based on the Fourier transform among these? (A) Structural (B) Spectral (C) Statistical (D) Topological	1	1	5	2
20.	The initial difference of the smallest size is known as according to the 4-directional code (A) Shape number (B) Chain number (C) Difference number (D) Code	1	2	5	2

	Marks	BL	CO	PO

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

21.	Distinguish between quantization and sampling in image processing.	4	2	1	1
22.	Calculate city block distance and chess board distance for the given sample image (between p and q)	4	3	1	1

	10	11	99	44	→q
	22	08	77	200	
	20	11	49	55	
p→	31	210	22	189	

23.	What is meant by power-law transform? How image processing can benefit from it?	4	2	2	2,3
24.	Give a brief overview of the Gaussian noise.	4	2	3	2
25.	Describe the principles of the compression model.	4	2	4	2
26.	Briefly discuss about Fourier descriptor and its applications.	4	2	5	2
27.	Differentiate low pass filter and high pass filter.	4	2	2	2,3

	Marks	BL	CO	PO

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

28. a.	Explain the components of the image processing system.	12	2	1	1
	(OR)				
b.	Describe the following (i) 4-adjacency (ii) 8-adjacency (iii) m-adjacency (iv) Euclidean distance	12	2	1	1
29. a.	Perform histogram equalization for the image given below	12	3	2	2,3

7	7	7	7	7
2	7	6	7	2
2	6	6	6	2
2	7	6	7	2
7	7	7	7	7

(OR)

b.	Let $I=\begin{pmatrix}3, 3\\3, 3\end{pmatrix}$ be an image $K=\begin{pmatrix}1, 2\\3, 4\end{pmatrix}$ be a kernel perform convolution and correlation.	12	3	2	2,3
30. a.	Derive a Wiener filter for image restoration and specify its advantages over inverse filter.	12	4	3	2
	(OR)				
b.	Explain canny edge detection in detail and give its applications.	12	2	3	2
31. a.	Construct Huffman code for the word "BABY". Also compare the efficiency of Huffman code.	12	4	4	2
	(OR)				
b.	Encode the word "ABCCD" using arithmetic coding. Give the procedure.	12	3	4	2
32. a.	Write short notes on the following image representation techniques		2	5	2
	(i) Chain code and	6			
	(ii) Polygonal approximation	6			
	(OR)				
b.	Describe in detail about texture and pattern classes.	12	2	5	2

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