

b. Elaborate on grey level transformation. 12 2 2 1

30. a. Consider the following image $f(x,y)$ what will be the new value of the pixel (2, 2) if smoothing is done using the following 3×3 neighbourhood filters. 12 3 3 4

	0	1	2	3	4
0	5	4	2	2	5
1	0	1	0	2	7
2	2	7	7	4	0
3	5	6	4	3	3
4	1	1	0	7	5

- (i) Mean filter
(ii) Median filter
(iii) Weighted average filter
(iv) Min filter
(v) Max filter

(OR)

b. Explain in detail the different noise models. 12 3 3 2

31. a. Write short notes on 12 3 4 2
(i) Sub band coding
(ii) Multi resolution expansion

(OR)

b. Construct Huffman code for the set of symbols given 12 3 4 4

Symbols	a_1	a_2	a_3	a_4	a_5	a_6
Probability	0.4	0.3	0.1	0.1	0.06	0.04

- (i) Compute average length of the code and entropy
(ii) Compute the compression ratio and efficiency

32. a. Explain polygon approximation using minimum perimeter polygon merging and splitting methods with neat sketches. 12 1 5 1

(OR)

b. Write in detail the components of pattern recognition system. 12 2 5 2

Reg. No.

B.Tech. DEGREE EXAMINATION, JUNE 2023

Fifth & Sixth Semester

18CSE353T – DIGITAL IMAGE PROCESSING

(For the candidates admitted during the academic year 2018-2019 to 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 & 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 | PO |
|---|-------|----|----|----|
| 1. Consider a continuous image $F(x,y)$. How could sampling and quantization be done?
(A) Digitizing the coordinate values and digitizing the amplitude values
(B) Only digitizing the coordinate values
(C) Only digitizing the amplitude values
(D) Digitizing the amplitude values and applying coding techniques | 1 | 2 | 1 | 1 |
| 2. Calculate the number of intensity levels (L) in a 10 bit image
(A) 256
(B) 258
(C) 1024
(D) 2048 | 1 | 3 | 1 | 1 |
| 3. Suppose that the height of the crane is 25 m and it is parked in a truck lay-by. You are standing at 100 m distance. Compute the height of crane in your retina. [Hint: FL of eye = 18 mm].
(A) 4.5 mm
(B) 4.1 mm
(C) 3.5 mm
(D) 2.5 mm | 1 | 3 | 1 | 1 |
| 4. A measure of the smallest change in intensity level is called _____.
(A) Spatial resolution
(B) Intensity resolution
(C) Grey level resolution
(D) Color resolution | 1 | 3 | 1 | 1 |
| 5. The sum of all components of a normalized histogram is
(A) 1
(B) -1
(C) 0
(D) Any positive value | 1 | 1 | 2 | 1 |
| 6. In linear spatial filtering, what is the pixel of the image under mask with coefficient $\omega(-1,-1)$ assuming 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 | 2 |

7. The primary objective of sharpening of an image is to _____. (A) Increase the brightness of the image (B) Blurring the image (C) Highlight fine details of the image (D) Not to change the image	1	2	2	1
8. Which filter turns the average value of a processed image to zero? (A) Notch filter (B) Parametric filter (C) Band pass filter (D) Inverse filter	1	1	2	1
9. Which is not a type of noise? (A) Gamma noise (B) Rayleigh noise (C) Black noise (D) Exponential noise	1	1	3	1
10. Band reject filter is used where noise components are usually (A) Known (B) Unknown (C) Taken (D) Reject	1	1	3	2
11. Which is the purpose of restoration? (A) To gain pixels (B) To gain original image (C) To gain degraded image (D) To gain coordinates	1	2	3	2
12. Mean filter reduce noise using (A) Acquisition (B) Sharpening (C) Restoration (D) Blurring	1	2	3	1
13. Every run length introduces new (A) Pixels (B) Matrix (C) Frames (D) Intensity	1	1	4	1
14. If pixels are reconstructed without error mapping it is said to be (A) Reversible (B) Irreversible (C) Temporal (D) Facsimile	1	2	4	1
15. $Pr = n / MN$ represents (A) Coding redundancy (B) Spatial redundancy (C) Temporal redundancy (D) Irrelevant information	1	2	4	2
16. Decoder is used for (A) Image enhancement (B) Image compression (C) Image decompression (D) Image equalization	1	2	4	1
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	1
18. The texture of the region provides measure of _____ properly. (A) Smoothness alone (B) Coarseness alone (C) Regularity alone (D) Smoothness, coarseness and regularity	1	2	5	1

19. The term, curvature is defined as (A) Rate of charge of area (B) Rate of charge of slope (C) Slope (D) Rate of slop of diameter	1	1	5	1
20. What is the unit of compactness of a region? (A) Meter (B) Meter 2 (C) No units (D) Meter 1	1	1	5	2

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

21. With a neat diagram, describe the elements of human eye.	4	2	1	1
22. Explain in detail about piecewise linear transformation.	4	2	2	2
23. Write notes on (i) Adaptive filters (ii) Order statistics filter	4	2	2	2
24. Elaborate on wavelet coding.	4	2	3	2
25. With suitable examples, explain chain codes.	4	2	4	2
26. Explain in detail canny edge detector.	4	2	4	1
27. What is lossless predictive coding? Explain.	4	2	5	1

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

28. a.	12	3	1	4
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> $\begin{array}{ccccc} & & \downarrow r & & \\ & 3 & 0 & 2 & 1 \\ p \rightarrow & 1 & 2 & 3 & 4 \\ & 4 & 1 & 0 & 3 \\ & 1 & 1 & 3 & 2 \\ & & & & \leftarrow q \end{array}$ </div> <div> Let $V = \{1, 2, 3\}$ </div> </div>				
(i) Check whether points p and q are (1) 4-adjacent (2) 8-adjacent				
(ii) See if the points p and r are (1) 4-adjacent (2) 8-adjacent (3) m-adjacent				

(OR)

b. Explain in detail the different steps in digital image processing.	12	2	1	1
---	----	---	---	---

29. a. Describe the various spatial domain filters used for image smoothing and image sharpening.	12	2	2	1
---	----	---	---	---

(OR)