Reg. No.															

B.Tech. DEGREE EXAMINATION, MAY 2024

Sixth Semester

18BMC306J – MEDICAL IMAGE PROCESSING

(For the candidates admitted from 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

	Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. Identify the transform which has poor energy compaction property for highly corelated images — 1 | 1 | 1 | 1
   (A) DCT (B) DFT
   (C) Hadamard (D) HAAR

2. Find the chess board distance for the image coordinates (5,4) and (7,8) — 1 | 1 | 1 | 1
   (A) 2 (B) 3
   (C) 4 (D) 5

3. If the number of gray level in the image is 512, the number of bits used to represent each pixels. — 1 | 1 | 1 | 1
   (A) 8 (B) 9
   (C) 10 (D) 11

4. Consider a person standing at a distance of 100 m looking at a tree whose height is 15 m. the focal length of the lens of a person is 17 mm. calculate the image formed in the retina of the eye of the person — 1 | 1 | 1 | 1
   (A) 2.5 mm (B) 2.55 mm
   (C) 2.75 mm (D) 3.5 mm

5. Identify the example of non-linear filter — 1 | 1 | 2 | 2
   (A) Low pass filter (B) High pass filter
   (C) Median filter (D) Band pass filter

6. Highlighting the specific gray level present in the image is called — 1 | 1 | 2 | 2
   (A) Intensity level slicing (B) Contrast stretching
   (C) Dynamic range compression (D) Bit plane slicing

7. _____model is used in color TV monitors. — 1 | 1 | 2 | 2
   (A) RGB (B) CMY
   (C) HIS (D) YIQ

8. ____refers to purity of color — 1 | 1 | 2 | 2
   (A) Hue (B) Saturation
   (C) Intensity (D) Brightness

9. The image degradation model is given by 1 1 3 1
(A) H=FG–N (B) F=HG–N
(C) F=NH–G (D) G=HF+N

10. Find the filters which does not come under order statistics filter 1 1 3 1
(A) Median filter (B) Max and min filter
(C) Midpoint filter (D) Laplacian filter

11. In unconstrained restoration, the restored image is given by 1 1 3 1
(A) $F = H^{-1}g$ (B) F=HG
(C) $G = F^{-1}H$ (D) G=FH

12. _____filter is good for random Gaussian and uniform noise 1 1 3 1
(A) Median filter (B) Max and min filter
(C) Midpoint filter (D) Laplacian filter

13. Non maxima suppression occurs in _____ 1 1 4 2
(A) Canny edge detection (B) Sobel edge detection
(C) Marr Hildreth (D) Prewitt

14. _____algorithm segments the regions into catchment basins. 1 1 4 2
(A) Watershed (B) Region growing
(C) Snake (D) k-means clustering

15. Seed points are fixed in _____algorithms. 1 1 4 2
(A) Watershed (B) Region growing
(C) Snake (D) k-means clustering

16. The Laplacian of Gaussian is called _____operator. 1 1 4 2
(A) Sobel (B) Prewitt
(C) Robert (D) Mexican hat

17. Feature map fusion is performed in _____fusion. 1 1 5 3
(A) Pixel based (B) PCA based
(C) Wavelet transform based (D) Frequency based

18. Decomposing the images into set of binary images takes place in 1 1 5 3
(A) Arithmetic coding (B) Huffman
(C) Bit-plane (D) Run length

19. Which of the following comes under lossy compression technique? 1 1 5 3
(A) Huffman (B) Arithmetic
(C) Bit plane (D) Transform

20. _____coding is slower than Huffman coding but achieve better compression 1 1 5 3
(A) Arithmetic coding (B) Transform
(C) Bit-plane (D) Run length

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Define DST and mention its properties.	4	2	1	1
22.	Illustrate adjacency and connectivity with an example.	4	3	1	1
23.	Write a brief note on log transformation and power law transformation.	4	2	2	2
24.	Convert RGB to HIS model with suitable mathematical expressions.	4	3	2	2
25.	Draw the image degradation model and mention its properties.	4	3	3	2
26.	Comment on region splitting and merging algorithm.	4	2	4	3
27.	Mention the types of registration and give an example.	4	2	5	3

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Elucidate the basic relationship between the pixels with an example.	12	3	1	1
	(OR)				
b.	Design a 2D DCT for N=4 mention the properties of 2D-DCT.	12	3	1	1
29. a.	Enumerate in detail about the pseudo color image processing using slicing technique and frequency approach.	12	2	2	4
	(OR)				
b.	Discuss in detail about the first order and second order derivative filter using suitable mathematical expressions.	12	2	2	4
30. a.	Derive the necessary expressions for least means square (wiener) filter for image restoration process.	12	3	3	3
	(OR)				
b.	Elaborate in detail about the digital implementation of filter back projection algorithm with a neat block diagram.	12	2	3	3
31. a.	Explain in detail about the canny edge detection algorithm.	12	2	4	2
	(OR)				
b.	Illustrate in detail about the segmentation using morphological watersheds based on dam construction and algorithm.	12	2	4	2
32. a.	Perform Huffman coding for the source symbols a_1, a_2, a_3, a_4, a_5, a_6 and a_7 with probabilities 0.05, 0.1, 0.6, 0.01, 0.04, 0.2. calculate the average length, entropy and efficiency.	12	2	5	3
	(OR)				
b.	Describe in detail about the pixel based image fusion.	12	2	5	3

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