28. a.	Obtain the Huffman code for the word "COMMITTEE".	10	4	3	3
	(OR)				
b.	Explain wavelet coding in detail.	10	4	3	3
29. a.	Derive the discrete wiener HOPF equation and the frequency response of IIR linear minimum mean square error filters.	10	3	4	3
	(OR)				
b.	Explain deformable motion, photometric image formation and geometric image formation with neat diagrams.	10	3	4	3
30. a.	Explain block matching method for motion estimation in detail.	10	3	5	3
	(OR)				
b.	Explain motion estimation and the optical flow with neat diagram. Also differentiate 2D motion and apparent motion in video coding.	10	3	5	3

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Reg. No.														

B.Tech. DEGREE EXAMINATION, NOVEMBER 2022
Sixth and Seventh Semester

18ECE243J – DIGITAL IMAGE AND VIDEO PROCESSING
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
1.	Bartlane system were capable of coding images in _____ distinct gray levels. (A) 5 (B) 10 (C) 15 (D) 20	1	1	1	3
2.	The process that assigns labels to an object based on descriptors are termed as (A) Image enhancement (B) Image preprocessing (C) Image segmentation (D) Image recognition	1	1	1	3
3.	Digitization of spatial coordinates is called as (A) Image sampling (B) Image smoothing (C) Gray level quantization (D) Image processing	1	1	1	3
4.	Cone vision is also called as (A) Photopic vision (B) Scotopic vision (C) Photographic vision (D) Magnetic vision	1	2	1	3
5.	The region in the retina where there is no receptors is called as (A) Rod (B) Cone (C) Blind spot (D) Fovea	1	2	1	3
6.	_____transformation, maps a narrow range of low intensity values of the input into a wider range of output levels. (A) Linear (B) Inverse log (C) Log (D) Pixel	1	1	2	3
7.	The _____filter is an order statistics filter. (A) Averaging (B) Weighted averaging (C) Median (D) Low pass	1	1	2	3
8.	The shape of a homomorphic filter is a _____filter. (A) Low pass (B) High pass (C) Band passs (D) Band stop	1	1	2	3

9. If $F(X,Y)$ is an image function of two variables, the first order derivative of one dimensional function $F(X)$ is — 1 2 2 3
   (A) $F(X+1)-F(X)$ (B) $F(X)-F(X+1)$
   (C) $F(X-1)-F(X+1)$ (D) $F(X)+F(X+1)$

10. The method used to generate a processed image that has a specified histogram is called as — 1 2 2 3
   (A) Histogram equalization (B) Histogram matching
   (C) Normalized histogram (D) Unnormalized histogram

11. _____transforms $f(x,y)$ into a format designed to reduce spatial and temporal redundancy. — 1 2 3 3
   (A) Mapper (B) Quantizer
   (C) Symbol coder (D) Symbol decoder

12. _____coding does not generate individual codes for each character. — 1 2 3 3
   (A) Block codes (B) Run length
   (C) Arithmetic (D) Huffman

13. The mask used for diagonal edge detection is — 1 1 3 3
   (A) 1 D mask (B) 2D mask
   (C) 3D mask (D) 4D mask

14. _____is used to extract the most appropriate location of an edge when there is a gradual change in intensity levels. — 1 1 3 3
   (A) Sobel operator (B) Laplacian operator
   (C) Prewitt operation (D) Gaussian operator

15. What does the total number of pixel in the region defines? — 1 1 3 3
   (A) Area (B) Intensity
   (C) Brightness (D) Contrast

16. The _____ensure that the picture starts at the top left corner of the receiving CRT. — 1 1 4 3
   (A) Blanking pulse (B) Sync pulse
   (C) Aspect ratio (D) Bandwidth

17. Which projection gives a realistic view? — 1 1 4 3
   (A) Perspective projection (B) Orthographic projection
   (C) Oblique projection (D) Isotropic projection

18. In perspective projection, all lines of sight start at a _____point. — 1 2 4 3
   (A) Multiple (B) Three
   (C) Two (D) Single

19. The 3D displacement of a rigid object in the Cartesian coordinates with rotation matrix R and translation matrix T can be modelled as — 1 2 4 3
   (A) $X' = TX + R$ (B) $X' = RX + T$
   (C) $X' = RX / T$ (D) $X' = RX - T$

20. In photometric image formation, the surfaces with negligible specular component are termed as — 1 1 4 3
   (A) Lambertian surfaces (B) Reflectance surfaces
   (C) Refractance surfaces (D) Incident surfaces

21. 2D motion is also called as _____motion. — 1 1 5 3
   (A) Projected (B) Translational
   (C) Spatial (D) Linear

22. In hierarchical block matching, low pass filtering may be performed by — 1 1 5 3
   (A) Box filter (B) Butterworth filter
   (C) Chebyshev filter (D) Temporal filter

23. _____problem is a special case of the correspondence problem where the two frames are globally shifted with respect to each other. — 1 1 5 3
   (A) Displacement (B) Registration
   (C) Acceleration (D) Occlusion

24. _____aims to describe the orthographic projection of a 3D motion of a surface in to the image plane. — 1 2 5 3
   (A) Non parametric model (B) Parametric model
   (C) Recursive model (D) Non recursive model

25. _____criterion requires a threshold comparator and a $\log_2(N_1 \times N_2)$ counter. — 1 2 5 3
   (A) Mean square error (B) Mean absolute difference
   (C) Matching pel count (D) Minimum mean square error

PART – B (5 × 10 = 50 Marks) — Marks BL CO PO
Answer **ALL** Questions

26. a. Describe the image formation in human eye. Also explain the brightness adaptation and discrimination. — 10 3 1 3

(OR)

   b. Explain DFT and the properties of 2D-DFT. — 10 3 1 3

27. a. Explain homomorphic filtering in detail. — 10 3 2 3

(OR)

   b. Perform histogram equalization on a 3-bit image of size 32×32 pixels. The intensity distribution of the image is given below. — 10 3 2 3

r_k	0	1	2	3	4	5	6	7
n_k	110	374	210	150	100	50	20	10