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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
 [AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
 Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 120020**

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Sixth Semester

Biomedical Engineering

U19BM612 – MEDICAL IMAGE PROCESSING

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

Q.No.	Questions	(10 x 2 = 20 Marks)		
		Marks	KL	CO
1.	List the basic components of image processing system.	2	K1	CO1
2.	Define Twiddle factor and List the properties of twiddle factor.	2	K1	CO1
3.	What is meant by histogram equalization?	2	K1	CO2
4.	Categorize the various frequency domain filters.	2	K2	CO2
5.	Why the restoration is called as unconstrained restoration?	2	K1	CO3
6.	Give the difference between Enhancement and Restoration.	2	K2	CO3
7.	Define local thresholding for edge detection.	2	K1	CO4
8.	How edges are linked through Hough transform?	2	K2	CO4
9.	What is meant by Erosion and dilation?	2	K1	CO5
10.	Classify the types of image representations.	2	K2	CO5

PART – B

Q.No.	Questions	(5 x 13 = 65 Marks)		
		Marks	KL	CO
11. a)	Explain the fundamental steps involved in digital image processing systems.	13	K1	CO1

(OR)

	b)	i. Summarize the human visual perception system in detail with necessary diagrams.	7	K2	CO1
		ii. Explain CMY and CMYK colour models.	6		
12.	a)	Describe histogram equalization. Obtain Histogram equalization for the following image segment of size 5 x 5. Write the inference on image segment before and after equalization.	13	K2	CO2
		(OR)			
	b)	Illustrate the 2D Fourier transform and its pair. State and prove their property.	13	K2	CO2
13.	a)	Write the necessity for restoration process in image processing and explain the process in detail.	13	K2	CO3
		(OR)			
	b)	Demonstrate about the various ways to estimate the degradation function for use in Image restoration with their respective mathematical model.	13	K3	CO3
14.	a)	Describe about the canny edge detector with necessary equation and also write its algorithm.	13	K1	CO4
		(OR)			
	b)	Analyze about the segmentation methods by Morphological watershed method.	13	K4	CO4
15.	a)	Explain the different types of boundary descriptors with suitable diagrams.	13	K2	CO5
		(OR)			
	b)	Solve and find a Huffman code and average length of the code and its redundancy for the source emits letters from an alphabet $A=\{a_1,a_2,a_3,a_4,a_5\}$ with probabilities $P(a_1)=0.2$ , $P(a_2)=0.4$ , $P(a_3)=0.2$ , $P(a_4)=0.1$ and $P(a_5)=0.1$ .	13	K3	CO5

### PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16.	a) Design the optimum Notch filter for periodic noise reduction by frequency domain filtering.	15	K5	CO3
	(OR)			
	b) Design the JPEG base line standard for compression and reconstruction of an 8x8 sub image.	15	K5	CO5