Sub Code: BECT075 **ROLL NO……..……..**

ODD SEMESTER EXAMINATION, 2024 – 25

4th Year (VII Sem) B.Tech.: Electronics & Communication Engg

Digital Image Processing

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any two parts of the following.	(10x2= 20)
	a) (i) List and describe the key steps involved in Digital Image Processing.	(5 marks)
	(ii)What are the essential components of a Digital Image Processing system?	(5 marks)
	b) What is Image Sampling and Quantization? Explain the significance of these processes in converting an analog image to a digital image.	(10 marks)
	c) Describe the concept of pixel relationships. How do pixel relationships affect image processing algorithms like filtering or edge detection?	(10 marks)
Q 2.	Answer any two parts of the following.	(10x2= 20)
	a) (i) What are Gray Level Transformations in Digital Image Processing? Provide examples of different types of gray level transformations.	(5 marks)
	(ii) Explain the concept of Histogram Processing in image enhancement.	(5 marks)
	b) What is a Smoothing Filter in the Spatial Domain? How does it help in reducing noise in an image?	(10 marks)
	c) What are Butterworth Filters in the frequency domain? Explain their characteristics and how they differ from ideal filters.	(10 marks)
Q 3.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Describe the characteristics of Salt-and-Pepper noise and Gaussian noise.	(5 marks)
	(ii) How does a Mean Filter work in image noise reduction, and what are its limitations?	(5 marks)
	b) What is an Adaptive Filter in image processing? How does it differ from conventional filters, and what applications benefit from adaptive filtering?	(10 marks)
	c) What is Inverse Filtering in image processing? Explain how it is used to restore an image affected by known degradation processes.	(10 marks)
Q 4.	Answer any two parts of the following.	(10x2= 20)
	a) (i) What is Point, Line, and Edge Detection in image segmentation?	(5 marks)
	(ii) What is Segmentation Using Morphological Watersheds?	(5 marks)
	b) Explain the concept of Thresholding in image segmentation. How does global and local thresholding differ, and when are they applied?	(10 marks)
	c) How do edge detection techniques like the Sobel and Canny operators help in the segmentation process? Compare their effectiveness in detecting edges.	(10 marks)
Q 5.	Answer any two parts of the following.	(10x2= 20)
	a) (i) What is Inter-frame Redundancy in video coding?	(5 marks)
	(ii) Explain Motion Estimation Techniques in video coding.	(5 marks)
	b) What is the concept of Forward and Backward Motion Prediction in video coding? How do these techniques help in predicting motion between video frames?	(10 marks)
	c) What is Temporal Segmentation in video processing? Explain the process of shot boundary detection and how it identifies hard-cuts and soft-cuts.	(10 marks)

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