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Bengaluru

Mid Term Examinations - October 2026

Date: 08/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: CAI3400 **Course Name:** Image Processing and Analysis

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	92	88

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	What is image translation?	2	CO1	BT2
2	Differentiate between sampling and quantization.	2	CO1	BT2
3	An image of size 512 × 512 is quantized to 8 bits per pixel. Calculate the total number of bits required to store the image.	2	CO1	BT3
4	Define contrast stretching.	2	CO2	BT1
5	Name two common smoothing (low-pass) filters used in the spatial domain.	2	CO2	BT1

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Compare the RGB and HSV colour models. For each model, state a typical application and justify why that model is preferred.	10	CO1	BT2
7	What is a histogram? Explain how histogram processing can be used for image enhancement. Explain histogram equalization and the role of the CDF in histogram equalization.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Describe spatial-domain smoothing filters. Explain the working of averaging filters and Gaussian filters. When would you prefer a median filter over a mean filter?	10	CO2	BT2
9	Explain contrast stretching and histogram equalization. Derive the transformation function used in histogram equalization and discuss its limitations.	10	CO2	BT2

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	An analog image is sampled at 256 × 256 pixels and quantized to 64 gray levels. (a) Calculate the total number of bits required. (b) If the same image is resampled at 512 × 512 and quantized to 256 gray levels, how many times larger is the new file size? (c) Discuss the visual impact of each choice.	10	CO1	BT3

11	Perform histogram equalization on a 3-bit image (8 intensity levels) whose histogram is given by: n_k = [0, 5, 10, 20, 25, 15, 10, 5] for r_k = 0 to 7 (Total pixels = 90). Show all intermediate steps and the equalized histogram.	10	CO1	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Construct a 3 × 3 weighted averaging filter mask that gives higher weight to the centre pixel. Apply it (conceptually) to a 3 × 3 neighbourhood whose centre pixel intensity is 100 and surrounding pixels are 50, 60, 70, 80, 90, 110, 120, 130. Compute the new centre value.	10	CO2	BT3
13	Compare inverse filtering and Wiener filtering for restoring an image degraded by blur and additive noise. Under what conditions does Wiener filtering overcome the limitations of inverse filtering?	10	CO2	BT3