

Exam.Code:0970
Sub. Code: 34552

2056

M.E. Electronics and Communication Engineering
Second Semester
ECE-1202: Digital Image Processing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

Section -A

- Q 1(a) How does spatial resolution affect image quality and storage requirements? (10)
- (b) What is Gaussian noise? How can it be represented using mean and standard deviation?
- (c) What is the difference between additive and subtractive color models?
- (d) What is aliasing in digital images?
- (e) Explain the difference between lossy and lossless image compression

Section -B

- Q2 (a) Identify environmental factors and hardware constraints that impact the quality of an image during the acquisition phase. How does the 'sampling' rate determine the final resolution ? (5)
- (b) Why is Histogram Equalization considered a 'global' enhancement technique, and in what specific scenarios might it actually make an image look worse?" (5)
- Q3 (a) Compare an 'Averaging Filter' with a 'Median Filter.' Which one is more effective at removing 'Salt and Pepper' noise (5)
- (b) Explain the concept of 'Convolution' in spatial domain filtering. How does a 3 X 3 filter mask move across an image. (5)
- Q 4 (a) Define Noise and Degradation and provide an example of a degradation function that is not caused by random noise. (5)
- (b) Explain how an adaptive filter changes its behavior based on the local variance of the image pixels." (5)

Section -C

- Q5 Explain the concept of 'Multiresolution Analysis' (MRA). Demonstrate how the Haar Transform decomposes data into 'Approximation' and 'Detail' coefficients. (10)
- Q6 (a) Explain why removing psychovisual redundancy is considered a 'lossy' process while removing coding redundancy is 'lossless'." Describe any lossless technique. (5)
- (b) Describe the 'Region Growing' algorithm. What are the criteria for selecting 'seed points,' and how do 'stopping rules' prevent the algorithm from over-segmenting an image? (5)
- Q7 (a) Explain how the Hough Transform converts points in the xy plane into curves. Describe it using an example. (5)
- (b) Consider a source with 5 symbols {A, B, C, D, E} with probabilities $P(A)=0.35$, $P(B)=0.25$, $P(C)=0.20$, $P(D)=0.15$, $P(E)=0.05$ Construct the Huffman Tree and assign binary codes to each symbol. Calculate the average code length and compare it to the source entropy. (5)

x-x-x