MACHAKOS UNIVERSITY

University Examinations for 2024/2025 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN TELECOMMUNICATION

SPH 448: IMAGE PROCESSING TECHNOLOGY

DATE: 14TH JANUARY 2025 **TIME: 11.00 AM - 1.00 PM**

INSTRUCTIONS:
Answer question ***ONE (Compulsory)*** *and* ***any other TWO*** *questions*

QUESTION ONE *(COMPULSORY)* (30 MARKS)

a) Describe the concepts of image sampling and quantization Explaining How they affect image quality (4marks)

b) Explain basic gray level transformations and Provide three examples of how these transformations can enhance image quality. (8marks)

c) (i) Explain image restoration in relation to Digital Image Processing (2marks)

(ii) Differentiate between Image Restoration and Image Reconstruction (2marks)

d) Explain Four techniques used in image reconstruction. (6marks)

e) Define histogram equalization (1mark)

f) Explain image compression (2marks)

g) Outline five Components of Digital Image Processing (5marks)

QUESTION TWO (20 MARKS)

a) Illustrate How image smoothing and sharpening interact with each other in practical applications and Provide examples where both techniques are used. (8marks)

b) With Suitable examples, illustrate three areas of applications of image processing in process industries (6marks)

c) Describe giving examples three Benefits for Image Processing: (6marks)

QUESTION THREE (20 MARKS)

a) i) Illustrate Four challenges associated with image restoration and reconstruction in practical applications of image processing. (8marks)

ii) In Part (i) above Describe Ways to Mitigate these challenges. (4marks)

b) Homomorphic filtering is a Filtering method used in image processing. With suitable examples, illustrate four advantages as compared to other methods.in processing of images. (8marks)

QUESTION FOUR (20 MARKS)

a) Illustrate the importance of image compression (2marks)

b) Lossy and lossless compressions are both methods used in image processing. Illustrate the differences between them in their applications (8marks)

c) With Suitable Illustrations Describe three categories of Digital Storage (6marks)

d) Using 32 Gray Levels, Calculate the number of bits required to store a 256X256 image (4marks)

QUESTION FIVE (20 MARKS)

a) Outline how image enhancement is achieved by point processing. (8marks)

b) Discuss any two methods used in (a) above (4marks)

c) Demonstrate the principle of histogram usefulness in image enhancement. (8marks)