



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FIFTH YEARSEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONIC ENGINEERING)

EEE 518 DIGITAL IMAGE PROCESSING DURATION

DATE:

TIME:

Instructions to candidates:

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your University number on the answer sheet.

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the following terms: (3 marks)
- Image
 - Brightness
 - Dynamic range
 - Contrast
 - Gray level
 - Color model

- b) Discuss briefly the principle of color model, its hardware orientation and applications. (4 marks)
- c) Explain the basic concepts of image sampling and quantization. (6 marks)
- d) Explain any 2 categories of image enhancement. (2 marks)
- e) Define subjective brightness and brightness adaptation. (2 marks)
- f) Outline any two objectives of image enhancement hence define the term spatial domain and point processing. (5 marks)
- g) In the field of multimedia and graphic design, data compression plays major role in enhancing effectiveness of memory utilization. In your own context show the importance of compression. (4 marks)
- h) Show how image restoration is achieved through inverse filtering approach. (4 marks)

QUESTION TWO (20MARKS)

- a) Briefly discuss about the elements of Digital image Processing system. (10 marks)
- b) Using illustration, demonstrate how visual perception model operates hence contrast its conventional model with Digital Image Processing system. (10 marks)

QUESTION THREE (20vMARKS)

- a) What is meant by image enhancement by point processing? Discuss any two methods in it. (12 marks)
- b) Demonstrate the principle of histogram usefulness in image enhancement. (8 marks)

Or

- c) Explain the term segmentation as its applicable in image processing (20 marks)

QUESTION FOUR (20 MARKS)

- a) Deduce an expression of smoothening in image processing through Wiener filter and enlist its importance. (8 marks)
 - b) Show how lossless predictive coding is useful in image compression (10 marks)
- or**
- c) Using the given data sequence, design a arithmetic coding process in variable length coding (20 marks)

QUESTION FIVE (20MARKS)

- a) Using illustration, explain the functional block diagram of JPEG Encoder and decoder. (14 marks)
- b) A source emits three symbol **A, B, C** wit probabilities {**0.5 and 0.25**} respectively. Construct an arithmetic code to encode the word '**C, A, B**' (6 marks)