



KENYA METHODIST UNIVERSITY

END OF 2ND TRIMESTER 2010 EXAMINATIONS

SCHOOL : **SCIENCE & TECHNOLOGY**
DEPARTMENT : **COMPUTER SCIENCE AND BUSINESS INFORMATION**
UNIT CODE : **CISY 406**
UNIT TITLE : **DIGITAL IMAGE PROCESSING**
TIME : **2 HOURS**

INSTRUCTIONS

***Answer question 1 and any other TWO from the four questions set*

***Marks are awarded for clear and concise answers*

Question 1[Compulsory]

- (a) What is scan conversion and what does it involve [3 marks]
- (b) A point p1 (2, 3) is rotated through $\Pi/6$ radians. Determine the new point p2 [3 Marks]
- (c) While explaining what image clipping is, elaborate on the technique used in achieving it [4 marks]
- (d) What is Z-buffer and what role does it play in image processing [3 marks]
- (e) Explain the role of the following hardware in image formation;
- (i) Frame buffer [3 marks]
 - (ii) Display controller card [3 marks]
- (f) Give a single homogenous transform matrix which will scale the x-direction of an image $\frac{1}{2}$ as large and then rotate counterclockwise by $\Pi/2$ about the origin [6 marks]
- (g) Differentiate between [4 marks]
- (i) Interlaced and non-interlaced monitors
 - (ii) Parallel and perspective projection
- (h) What is MATLAB [1 mark]

Question 2

Briefly describe the role of the following in image processing [15 marks]

- (i) Smoothing
- (ii) Linear filtering
- (iii) Adaptive filter
- (iv) Segmentation
- (v) Im-filter in MATLAB

Question 3

- (a) Briefly describe the operation of the following image compression algorithms [8 marks]
- (i) Run-length encoding
 - (ii) Huffman coding
- (b) Giving examples, differentiate between [6 marks]
- (i) Lossless and Lossy compression
 - (ii) Multi-dimensional and one-dimensional signals
 - (iii) Resolution and Bitmap image

(c) What do you understand from the term pixel [1 mark]

Question 4

(a) Explain how the structure of human visual system is adapted to image Processing [6 marks]

(b) Outline 3 issues of consideration in the design and development of image/graphics processing software [3 marks]

(c) Briefly justify any TWO main design considerations that should be made in image/graphics handling hardware [4 marks]

(d) What is aliasing and why is it undesirable [2 marks]