# UNIVERSITY OF ESWATINI

## FACULTY OF SCIENCE AND ENGINEERING

## DEPARTMENT OF COMPUTER SCIENCE

## MAIN EXAMINATION, MAY 2019

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|---|---|---|
| Title of Paper | : | **Computer Graphics** |
| Course Number | : | **CSC352** |
| Time Allowed | : | **Three (3) Hours** |
| Instructions | : | Answer **ALL** questions in Section A<br>Answer **only THREE** questions from Section B<br>All questions are worth **20 marks** |
| Special requirement | : | **None** |

This paper should not be opened until permission has been granted by the invigilator.
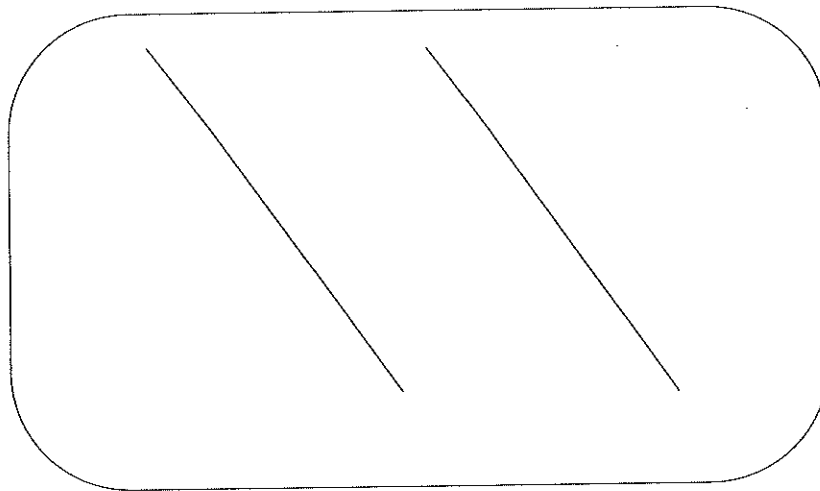
## SECTION A
*Answer all questions from this section.*

Question 1.
- (a)  Describe how computer graphics differs from image analysis.  [4]
- (b)  Why don't we see the colour black yet recognize it?  [3]
- (c)  Why should we study user interfaces alongside computer graphics?  [3]
- (d)  Describe what OpneGl is  [5]
- e)  Why was computer graphics not so widespread at its inception?  [5]

Question 2
- (a)  Differentiate between a viewport and a frame buffer.  [4]
- (u)  Discuss the slim advantage of vector graphics over raster graphics.  [4]
- (c)  Draw the CRT input signals for the following output:  [12]

## SECTION B

*Answer any three questions from this section.*

Question 3

(v)  In what way(s) was vector graphics displays superior to printers?  **[4]**

(w)  Sizes of CRTs are normally given by the length of their diagonal (the ratio of the width and height is standardized at 2:3). With a 14" tube and a *640* x *480* pixel screen, what are the horizontal and vertical resolutions? How could an aspect ratio of 1:1 be achieved on such a screen?  **[10]**

(x)  How much memory is needed for a *520 x380* frame buffer with depth 2?  **[6]**

Question 4

(a)  Briefly describe how a CRT works.  **[8]**

(b)  Write an OpenGl program to draw a revolving triangle on a screen.  **[12]**

Question 5

(a)  Find the transformation matrix for rotation around an arbitrary point $(x, y)$ over an arbitrary angle $\Phi$.  **[6]**

(b)  Compute the coordinates of the image of (3, 2) after each of the following transformations:
  –  rotation around the point (4, 1) through an angle of 90°;
  –  rotation around the point (3, 2) through an angle of 30°.  **[6]**

(c)  Establish and briefly describe all the possible segment-segment relations.  **[8]**

Question 6

(a)  Write a program to draw a chessboard to fill your entire VDU (include the design of your program (pseudocode))  **[20]**