NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2011

SUBJECT: **COMPUTER GRAPHICS**
CODE: **SCS4203**

INSTRUCTION TO CANDIDATES

Answer any four (4) questions.
The paper consists of six (6) questions and each question carries 25 marks.

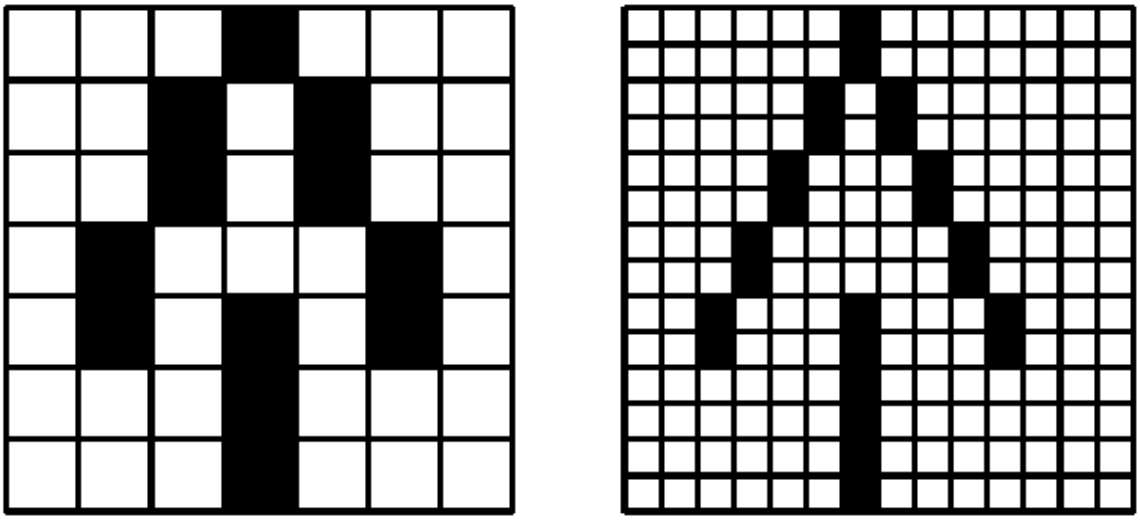
3 HOURS

QUESTION ONE

a) Define the following Computer Graphics terms:

i. Pixel [2]
ii. Frame buffer [2]
iii. Raster image [2]
iv. Vector image [2]
v. Scan line [2]

b) For each image (a) and (b) in figure 1.1, calculate the aspect ratio and the storage capacity given that each square represents a pixel of a black and white display unit. [10]



(a) Low Resolution (b) High Resolution

Figure 1.1: A tip of an arrow drawn as raster graphics in two different resolutions

c) Assess the effects of resolution on an image. [5]

QUESTION TWO

a) With the aid of a well labelled diagram, illustrate the basic operation of a CRT display device. [5]

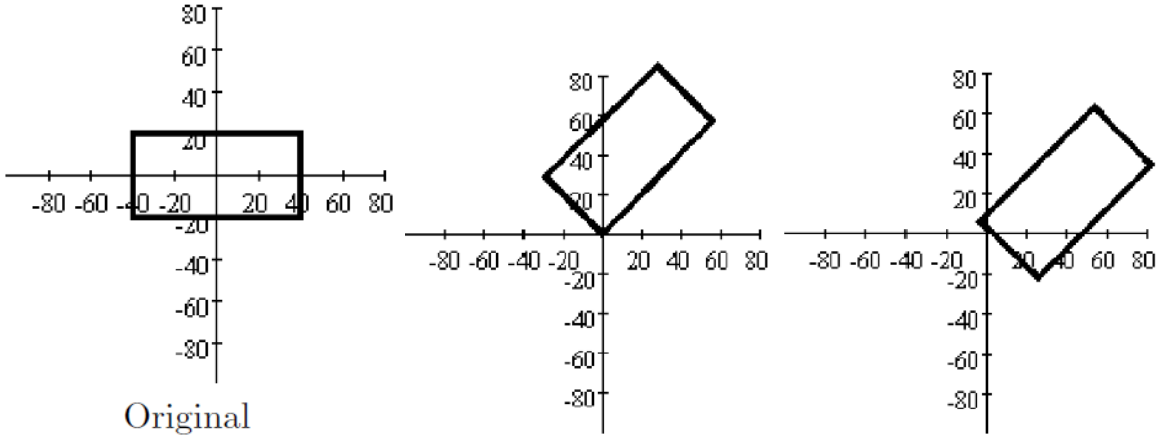
b) Using the **Midpoint Circle Algorithm,** write a C++ or Java program to draw a circle with radius and centre prompted from an input menu. [20]

QUESTION THREE

a) Determine the form of the transformation matrix for a reflection about an arbitrary line with equation y = mx + c. [5]

b) Describe the clipping operation of a point P (x,y) in a clip window (xw_{min}, xw_{max}, yw_{min}, yw_{max}) in standard position. [8]

c) In figure 3.1, separate transformations were carried out on the original image (a) in order to get output (b) and (c) respectively. Determine and compare the two transformations. [12]



(a) (b) (c)

Figure 3.1: Transformation

QUESTION FOUR

a) List any five computer graphics output devices. [5]

b) Explain the viewing pipeline from modelling coordinates to final device coordinates. [10]

c) Describe the computer-animation sequence. [10]

QUESTION FIVE

a) State any five visibility-detection methods. [5]

b) Compare and contrast parallel projection and perspective projection. [10]

c) Examine the difference you might expect in an image on a scene rendered with ambient light and one rendered in a scene with diffuse reflection. [10]

QUESTION SIX

a) Computer graphics methods are widely used in both fine art and commercial art applications. Expound. [5]

b) Use a diagram to represent and explain the two possible orientations for a Cartesian screen reference system. [10]

c) Describe the RGB colour model. [10]

END OF QUESTION PAPER