NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
JUNE EXAMINATIONS 2004

COURSE: COMPUTER GRAPHICS
CODE: SCS 5104

INSTRUCTIONS TO CANDIDATES

This question paper consists of **Five** questions.
Answer **any four (4)** questions

3 HOURS

QUESTION ONE

a) Give a detailed description on how vector displays, render graphics objects [8]

b) State Nyquist sampling theorem [3]

c) Distinguish between dot-pitch and resolution in graphics display context. [4]

d) The two commonly used virtual reality methods are immersive virtual reality and desktop virtual reality. Explain and describe in detail how each of these methods work. [10]

QUESTION TWO

a) Write down the steps in Cohen-Sutherland clipping algorithm [8]

b) Distinguish between a viewport and a window [3]

c) Find the general form of the transformation S which maps a rectangular window with x extent xw_{min} to xw_{max} in the x-didrction and y extent yw_{min} to yw_{max} in the y-direction onto a rectangular viewport with x extent xv_{min} to xv_{max} and y extent yv_{min} to yv_{max}. [8]

d) Write detailed notes on the following graphics concepts.
   i) Aspect ratio
   ii) Frame refresh
   iii) Scan conversion [6]

QUESTION THREE

a) Explain the construction and operation of a Plasma Pannel Display [6]

b) Describe computer graphics' contribution to the following areas:

i) Visualisation
ii) Animation [8]

c) What is the fraction of the total refresh time per frame spent in retrace of the electron beam for a non-interlaced raster system with a resolution of 1280 by 1024, a refresh rate of 60hz, a horizontal retrace time of 5 microseconds and a vertical retrace time of 500 microseconds [4]

d) Write a general form of matrix representing a scaling with respect to a fixed point P(h,k) followed by a shear parallel to the x-axis in three-dimensional space. [7]

QUESTION FOUR

a) Write a C++/Java program to render a triangle with a user-specified coordinates of vertices. The user, after the triangle has been drawn should have the option to rotate it about an arbitrary point (h,k) through an angle θ [15]

b) Explain how you can improve the stairstep appearance of displayed primitives generated by raster algorithm [10]

QUESTION FIVE

a) Outline the importance of geometrical transformations in computer graphics [10]
b) Raster line algorithms like the Bresenham's line algorithm display line type by plotting what is known as the pixel spans. Expain in detail how various dashed, dotted, dot-dashed lines, are displayed by these line drawing algorithms using a pixel mask specification. [5]
c) Write a C++/Java program to generate a sector of a circle with radius of 10 units, center at the origin and an angle subtended by the sector arc is θ [10]

END OF QUESTION PAPER

GOOD LUCK!