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

COURSE: **COMPUTER GRAPHICS**
CODE: **SCS4203**

INSTRUCTIONS TO CANDIDATES

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

3 HOURS

QUESTION ONE

a) A proposed graphics system uses 260-line interlaced scan with 36 frames per second.

   i) Calculate the vertical and horizontal scan rates [2]
   ii) Compare and contrast interlaced scanning and non-interlaced scanning [6]

b) Outline the advantages and disadvantages of using Liquid Crystal Display (LCD) [8]

c) Give a detailed description of the use of computer graphics in design processes [9]

QUESTION TWO

a) First define the term persistence and secondly state where it is most appropriate when it is
   i) low
   ii) high [5]
b) Give a detailed description of the operations of a graphics controller [10]

c) Given two video cards the first video card having 32MB of Window RAM (WRAM) and the second having 32MB of Dynamic RAM (DRAM), which one would you select to improve performance for of a graphics system? Justify your choice by stating the characteristics of each RAM type. [6]

d) Describe how a dot-matrix produces graphics objects [4]

QUESTION THREE

a) Outline the steps involved in the following transformation cases for a rotation in three-dimensional space.
   i) Rotate an object about an axis that is parallel to one of the coordinate axes. [3]
   ii) Rotate an object about an axis that is not parallel to one of the coordinate axes. [6]

b) Define Ray-tracing, and give specific examples of its application [6]

c) With the aid of a diagram explain the stages in a two-dimensional viewing-transformation pipeline [10]

QUESTION FOUR

a) For basic lighting there are 3 different components:
   i) Diffuse lighting
   ii) Ambient lighting
   iii) Specular lighting

Write a detailed list of the characteristics of each component [12]

b) Discuss any four anti-aliasing techniques you are familiar with [13]

QUESTION FIVE

a) Consider an RGB raster system that has 512-by-512 frame buffer with 20bits per pixel and a colour look-up table with 24-bits per pixel.
   i) How many distinct colours can be displayed by this system? [2]
   ii) What is the total memory size required for this system? [2]
   iii) Explain two methods for reducing memory size while maintaining the same colour capabilities [7]

b) Compare and contrast Phong shading and Gourand shading [6]

c) Explain how you would modify the Bresenham's line algorithm to render any line on the display unit. [8]

END OF QUESTION PAPER

GOOD LUCK