

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2005

SUBJECT: COMPUTER GRAPHICS
CODE: SCS4203

INSTRUCTION TO CANDIDATES

This question paper consists of Five questions. Answer any Four questions.
Each question carries 25 marks

Time: 3 hours

QUESTION ONE

a) Briefly, in conceptual terms, how can a raster scanning operations enable fast scrolling. [10]

b) Explain how the display shown in Figure 1 operates [5]

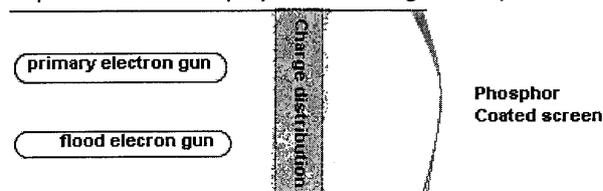


Figure 1

c) Distinguish between a window and a viewport [2]

d) Some of methods studied that can be used to plot pixel positions along a straight line are the DDA algorithm and the mid point method. Describe how each method works. [8]

QUESTION TWO

a) Outline the functions of a video processor (video controller, graphics controller, display processor mean the same device) in a graphics system. 10]

b) State the benefits and the limitations of ray tracing [6]

c) Vector scaling is multiplication of a vector by a scalar. Using vector scaling, give a formula for a vector \mathbf{s} , which is a weighted average of the three vectors \mathbf{p} , \mathbf{q} , and \mathbf{r} . [1]

d) Give two important applications of vector dot product. [2]

e) Compare and contrast the Random Scan CRT and the Raster Scan CRT. [6]

QUESTION THREE

a) What are the main factors that affect scan-convert a filled area? [6]

b) Write pseudocode for Liang-Barsky line clipping algorithm [19]

QUESTION FOUR

Write a menu driven C++ program that allows the user to render a line of arbitrary gradient implementing Bresenham's line generating algorithm. [25]

QUESTION FIVE

a) Use the mid point circle generating algorithm to generate the first six (6) coordinates of a circle with centre at (8;15) and radius of 7units($r=7u$). [15]

b) Outline the rationale behind the development of Graphics Software Standards, giving examples where appropriate. [8]

c) Suppose you have a system with 8-inch by 10-inch video display that can display 100 pixels per inch. If the memory is organised in one-byte words, the starting frame buffer is 0, and each pixel is assigned one byte storage, what is the frame buffer address of the pixel with screen coordinates (x;y)? [2]

END OF QUESTION PAPER