

UGANDA MARTYRS UNIVERSITY

NKOZI

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

**DEPARTMENT OF COMPUTER SCIENCE &
INFORMATION SYSTEMS**

END OF SEMESTER FINAL ASSESSMENT

SEMESTER I, 2020/21

Bsc. COMPUTER SCIENCE

Bsc. IT, SCIENCE GENERAL, EDUCATION AND COMPUTER SCIENCE

DATE: 9TH JULY, 2021

TAKE HOME

TIME: 7 Hours

INSTRUCTIONS:

- 1. ATTEMPT ALL QUESTIONS**
 - 2. CHEATING OF ANY KIND IS UNACCEPTABLE**
 - 3. ALL ROUGH WORK SHOULD BE IN YOUR SUBMISSION**
 - 4. ALL SUBMISSIONS WILL BE SUBJECTED TO PLAGIARISM CHECKS**
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CASE STUDY

Chak-Ria Graphics systems limited is a recently registered graphics company whose main goal is to provide graphics solutions. The company is in the wake to recruit experts in all graphics application fields. Given that you have been selected to head the technical graphics interview team, prepare solutions to the following questions that are to be used during the upcoming interviews.

QUESTION ONE

- a) (i) Given four 2-dimension points A0, A1, B0, and B1. Design a robust procedure to determine whether the line segments A0, A1 and B0, B1 intersect [3 Mks]
(ii) Give that the first column of a matrix A has point 10 and 7 and its second column has points 6 and 6. prove that $A^{-1} \times A = I$ [3 Mks]
- b) Describe the three properties of a video monitor that graphics system developers need to consider [3 Mks]
- c) Explain any four principles of animation that graphics system developers need to consider [2 Mks]
- d) (i) Describe any four animation functions that graphics system developers need to consider [4 Mks]
(ii) Discuss any five animation techniques that graphics system developers need to consider [5 Mks]

QUESTION TWO

- a) Given a polygon of three points represented with vectors of $a = [17, 13]$, $b = [12, 10]$, and $c = [14, 24]$
 - (i) Rotate the points based on the angle of 90 degrees anti-clock wise [2 Mks]
 - (ii) Translate the points using a factor of 7 in x direction and 8 in y direction [2 Mks]
 - (iii) Reflect the points through the y axis [2 Mks]
- b) Using diagrams, discuss three types of lines as considered in graphics clipping [4 Mks]
- c) Discuss any three pointing devices which graphics system developers need to consider [3 Mks]

- d) (i) Discuss any four types of sorting algorithms that graphics system developers need to consider [4 Mks]
- (ii) Using a diagram illustrate with explanations the OpenGL rendering pipeline [3 Mks]

QUESTION THREE

- a) (i) With use of a diagram, discuss parts of a display processor as used in computer graphics systems [4 Mks]
- (ii) Explain any four properties, of a good line drawing algorithm that graphics system developers need to consider [2 Mks]
- b) Given that an image size with points $a = (4, z)$ and $b = (-2, -1)$ stretches for 10 centimeters on a cartesian plane, find the exact cartesian points for x [4 Mks]
- c) Identify any three algorithms for line drawing that graphics system developers need to consider [3 Mks]
- d) (i) Explain the pros and cons of DDA algorithm that graphics system developers need to consider [4 Mks]
- (ii) With support of diagrams, explain two methods by which graphics system developers can identify whether a particular point is inside an object or outside [5 Mks]

QUESTION FOUR

- a) Given that, Chak-Ria Graphics systems limited is work on a 3D graphics product represented on a cartesian plane by three simultaneous equations namely, i) $x-3y+3z=-4$, ii) $2x+4y-z=15$, iii) $4x-5y-z=19$. Use a matrix approach to find value for x , y and z in the simultaneous equations [6 Mks]
- b) Explain the concept of Homogenous Coordinates as used in graphics systems [3 Mks]
- c) With use of diagrams, discuss the two major types of parallel projection [4 Mks]
- d) (i) Discuss any four Types of Coherence as used in graphics system hidden surface removal [4 Mks]
- (ii) With examples, discuss the concept of affine transformations as used in computer graphics systems [3 Mks]

QUESTION FIVE

- a) Given two image locations in 3D, name $a = [12, 13, 14]$ and $b = [15, 16, 17]$

- (i) Calculate the cross product of the image [3 Mks]
- (ii) Calculate and state the angle between the two image locations [3 Mks]
- b) Explain the two graphics card types that graphics system developer should consider [4 Mks]
- c) With an example in each, discuss the two complementary points of view for describing object transformation that graphics system developers need to consider [4 Mks].
- d) (i) With the help of diagrams, discuss the two types of image scanners that graphics system [4 Mks]
- (ii) Using a diagram, illustrate the three key components of a modern graphics display system [2 Mks]

END

~SUCCESS~