MASINDE MULIRO UNIVERSITY OF

SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

MAIN EXAM

2021/2022 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

COURSE CODE: **BCS 320/BIT 322E**

COURSE TITLE: **COMPUTER GRAPHICS**

DATE: 17/04/2023   **TIME: 8:00-10:00AM**

INSTRUCTIONS TO CANDIDATES:
SECTION A IS COMPULSORY. ANSWER ANY OTHER TWO QUESTIONS IN SECTION B
TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

SECTION A [COMPULSORY]   QUESTION ONE [30 MARKS]

QUESTION 1

a) Explain the following output technologies in terms of how they form an image: [4 Marks]
   i) LED
   ii) Plasma
   iii) CRT
   iv) LCD

b) Describe the process of pre-processing and segmentation during the process of pattern recognition.   [4 Marks]

c) Describe the major steps in the imaging process: [4 Marks]

d) Write a program that draws a straight line in any language that you are comfortable with and displays it on the screen.   [4 Marks]

e) A newly recruited ICT officer is asked to draft specifications for his new laptop. The officer decides to specify a 4k video card. How much memory would the graphics card be able to draw for an 24-bit color depth?   [4 Marks]

f) Describe the difference between the raster primitives and the geometric primitives: [2 Marks]

g) Assume that you have been asked by your Art teacher to model a sphere. Is it possible that you can approximate the sphere using triangular strips and fans? Please illustrate your answer using a drawing.   [4 Marks]

h) We cannot make measurements from a perspective view. Justify this statement using an appropriate reason.   [4 Marks]

SECTION B

Choose any two questions in this section

QUESTION 2

a) Describe the three steps for implementing texture mapping: [6 Marks]
b) Explain one application area of perspective viewing.   [4 Marks]
c) There has been a long argument within the Graphics Community to keep the Graphics Software API with a small set of basic primitives. What is the reason behind this argument? [4 Marks]
d) Describe the following transformations with the aid of supporting diagrams.   [6 Marks]
   - Scaling
   - Shear
   - rotation

QUESTION 3

a) Explain the following terms as used in computer graphics: [5 Marks]
   - Rasterization
   - Rendering
   - Fragmentation
   - Clipping
   - View volume

b) Explain the four major application areas in computer graphics while giving an example for each of them: [6 Marks]

c) Computer Graphics has been hugely implemented in manufacturing industries for example the car manufacturing industries. Describe briefly how curves and surfaces would be used for such an industry? [7 Marks]

d) Compare between a lossy and a lossless compression when managing images: [2 Marks]

QUESTION 4

i) Explain the following and the role they play in viewing of objects: [3 Marks]
   - Central Processing Unit
   - Graphics Processing Unit
   - Framebuffer

j) Explain an industrial application of texture mapping. [2 Marks]

k) Suppose that a set of images are texture-mapped with regular patterns such as stripes and checkerboards and that the images are supposed to be used in social media applications. It's possible that during storage we do not have to store an entire image to save on storage. What strategy can be applied so that we save storage space but still display an image of its original quality as required by the user? [6 Marks]

l) Assume that you have been newly employed in a super car manufacturing plant that produces the Aston Martin. The company has been in the process of reviewing the old model shape with regard to the reviews from its customers. You have been chosen as a team player to lead in the process of designing the new shape. Would you prefer to redesign the car's door or bonnet using control points or data points? Why? Please illustrate your answer using appropriate diagrams. [9 Marks]

QUESTION 5

a) Describe how ray tracing can be used to create complex objects. For example, the image below was created by 116,000,000 triangles. [6 Marks]

b) Assume that your teacher gave you an assignment to model cartoons and give them life by animation. Describe the procedure that you would employ to develop the assignment. Where possible you can also use certain methods/functions to demonstrate it. [4 Marks]

c) Frame buffers are said to have a certain depth. To what does the depth refer to? [4 Marks]

d) Describe an application area for radiocity. [2 Marks]
e) What are some of the color models in use today? [2 Marks]. How is shading important in Computer Graphics? [2 Marks]