



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

SUPPLEMENTARY / SPECIAL EXAM

THIRD YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF BACHELOR

OF

COMPUTER SCIENCE

COURSE CODE: BCS 320/BIT 322E

**COURSE TITLE: COMPUTER GRAPHICS/ COMPUTER GRAPHICS AND
ANIMATION**

DATE: FRIDAY 29-07-2022

TIME: 8:00A.M-10:00A.M

INSTRUCTIONS TO CANDIDATES

**Question ONE (1) is compulsory
Attempt any TWO (2) questions**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION 1: 30 MARKS (COMPULSORY)

- a) Explain an industrial application of texture mapping. 2 Marks
- b) Differentiate between the CPU and GPU? 2 Marks
- c) Computer graphics is a discipline that cuts across many other disciplines including Physics, Sciences, Arts and so on. With regard to application areas, how is Computer graphics important in **Design**. Explain using two major examples? 8 Marks
- d) Assuming that you wanted to approximate a sphere. Is it possible to do so using triangle strips and fans? If yes, please explain? You can illustrate using diagrams. 5 Marks
- e) A graphics student decided to design the laptop specifications by describing a 4K video card screen size. What memory in GB would it draw for an 8-bit color depth? 5 Marks
- f) Explain the following computer graphics display technologies: 8 Marks
- i. CRT
 - ii. LCD
 - iii. TFT
 - iv. LED

QUESTION 2: 20 Marks

- a) A simple compression scheme would be to store only a checkerboard pattern of alternate pixels and then, at display time, interpolate missing pixel values from the known neighboring values. Would this be an example of lossy or lossless compression? Explain your answer? 5 Marks
- b) Differentiate between geometric primitives and image/raster primitives, providing relevant examples to illustrate them. 6 Marks
- c) Describe the various components of the graphics pipeline? 5 Marks
- d) Write a small program in your language of understanding how you will draw a line and display on the screen? 4 marks

QUESTION 3: 20 Marks

- a) Explain the five stages of pattern recognition systems. 5 Marks
- b) Explain two application areas of pattern recognition systems. 2 Marks
- c) Explain the stages of geometric pipeline? 5 Marks
- d) Given is a triangle with the vertices $A = (-1, 0, 0)$, $B = (1, 0, 0)$, $C = (0, 1, 0)$. The triangle is rendered in OpenGL using fully saturated red for vertex A ($C_A = (1, 0, 0)$), fully saturated green for vertex B ($C_B =$

(0, 1, 0)), and fully saturated blue for vertex C ($C_C = (0, 0, 1)$). What is the color C_P at the point $P = (0, 0, 0)$? 2 Marks

e) In the movies and television, the wheels of cars and wagons often appear to be spinning in the wrong direction. What causes this effect? Can anything be done to fix this problem? Explain your answer. 6 Marks

QUESTION 4: 20 Marks

a) The process of image formation for a camera and a computer graphics application program is related and different at the same time.

i. Describe the similarities? 5 Marks.

ii. Describe the differences? 5 Marks

a) Differentiate between implicit, explicit and parametric curves. Use relevant examples to illustrate them. 6 Marks

b) Explain any two industrial applications of curves and surfaces. 4 Marks

QUESTION 5: 20Marks

a) Explain any three types of affine transformations using appropriate illustrations. 6 Marks

b) How many levels of recursion will you need in a ray tracer to show the reflection on a sphere of a texture that is mapped onto one of the walls of the room? How many levels if a transparent sphere lies between the wall and the reflective sphere? Justify your answers. 4 Marks

c) What are the differences between flat shading, gouraud shading, and phong shading of polygons? 6 Marks

d) Explain any two application areas of affine transformations. 4 Marks