

School of Engineering, Computing and Built Environment

Department of Computing

Bachelor of Computer Science (Hons) / Bachelor of Computer Science (Hons)  
in Computer and Network Technology

**COMPUTER GRAPHICS (CCG3013/N)**

September 2022 Semester

Final Examination

Duration: 2 hours

Total Marks: 100

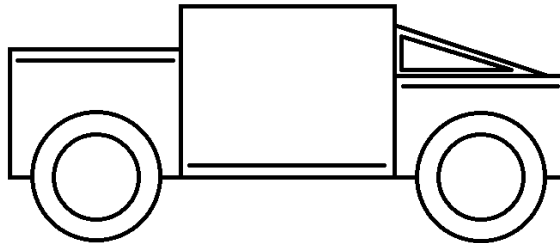
**Instructions**

1. This examination paper consists of **2 pages**, including this cover page.
2. There are 4 sections:   Section A (60 marks)  
                                  Section B (10 marks)  
                                  Section C (15 marks)  
                                  Section D (15 marks)
3. Read carefully the instructions printed at the beginning of each section.
4. All answers are to be written in the answer booklet(s) provided. Use black or blue ink only. Pencils may be used for sketches and diagrams.
5. Examination paper and answer booklet(s) are **not allowed** to be taken out from the examination room.

**Answer all questions in all sections.**

**Section A (60 marks)**

1. Name and discuss four applications of computer graphics. (12 marks)
2. Explain and draw five Euclid's postulates. (15 marks)
3. Explain a unit form. Then, specify the two dimensional (2D) primitives and the corresponding quantities for a unit form in Figure 1 below. (10 marks)



**Figure 1: Unit form**

4. Given a three-dimensional (3D) original point,  $(x, y, z)$  at  $(15, 20, 25)$  in the 3D space. Compute the corresponding image point with the following transformations.
  - (a) Translate with a vector of  $(10, -20, -25)$ , (4 marks)
  - (b) Rotate clockwise (CW) at 50 degrees along y-axis, (4 marks)
  - (c) Rotate counter-clockwise (CCW) at 78 degrees along z-axis, (4 marks)
  - (d) Scale with the factors of  $(2/5, 1/2, 4)$ . (4 marks)
5. Briefly describe a digital video. Then, name and explain the two unique parameters of a digital video. (7 marks)

**Section B (10 marks)**

Evaluate and justify three suitable Disney's principles of animation for a water dam in energy generation. (10 marks)

**Section C (15 marks)**

Write a function in C++ OpenGL to get a position of a mouse input,  $(x, y)$  and to toggle the status of right mouse button. (15 marks)

**Section D (15 marks)**

Write a render function in C++ OpenGL to scale a 100 units' radius sphere with a step radius increases by 2%, then stop the animation when the radius reached 200 units. (15 marks)

**THE END**

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