UOW MALAYSIA KDU PENANG UNIVERSITY COLLEGE

PART OF THE UNIVERSITY OF WOLLONGONG AUSTRALIA GLOBAL NETWORK

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)

January 2022 Semester
Final Examination

Duration: 2 hours
Total Marks: 100

Instructions

1. This examination paper consists of **3 pages**, including this cover page.
2. There are 3 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. Students caught copying, or having any unauthorized material, or engaging in any form of action with the intention to cheat will be penalized.

Section A (60 marks)

Answer all questions.

1) Discuss three advantages and three disadvantages of virtual reality (VR) as an application in working environment. (12 marks)

2) Explain a unit form in two statements. Then, state two dimensional (2D) primitive elements and the corresponding quantities for a unit form in Figure 1 below. (10 marks)

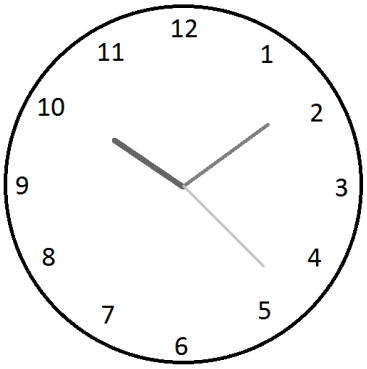

Figure 1: Unit form

3) Given a three-dimensional (3D) point origin at (23, 18, 15) in the 3D space. Compute the corresponding image point with the following matrix transformations.
   (a) Translate with a vector of T(-2, 6, -12) (4 marks)
   (b) Rotate clockwise at 45 degrees along x-axis, R(45) (4 marks)
   (c) Rotate counter-clockwise at 20 degrees along z-axis, R(-20) (4 marks)
   (d) Scale with a factor of (2, 2.5, 1.5) (4 marks)

4) Define a glyph. Then, state and discuss two font libraries that are available for OpenGL. (12 marks)

5) Discuss the procedure involved for mesh generation approach to construct a 3D model. (10 marks)

Section B (10 marks)

Answer all questions.

1) Briefly describe Disney's principles of animation. Then, evaluate and justify with three suitable principles of animation for a waterfall of a musical fountain. (10 marks)

Section C (15 marks)

Answer all questions.

1) Write a function definition in C++ OpenGL to draw an ellipse, whereby the height is two times the width. (10 marks)

2) Write a function definition in C++ OpenGL to render a wireframe sphere in cyan colour, with radius five for the size, 25 lines of latitudes, and 24 lines for longitude. (5 marks)

Section D (15 marks)

Answer all questions.

1) Develop a complete render function in C++ OpenGL to generate a path of looping wave in yellow colour for a point moving along the x-axis, based on sine function with amplitude 0.1, starting at the coordinates, (0, 400). (15 marks)

THE END

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