Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	:	GRAPHIC PROGRAMMING
COURSE CODE	:	BIT 20203
PROGRAMME CODE	:	BIT
EXAMINATION DATE	:	JUNE / JULY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Explain what is meant by rigid body transformation.

(4 marks)

(b) List **TWO** (**2**) rigid body transformation .

(4 marks)

Q2 Consider the transformation necessary to rotate a 2-dimensional triangle `(4,2)`, `(10,2)` and `(7,5)` centered at `(4,2)` by `90°`. The resulting object is still to be centered at `(4,2)`.

(a) List the sequence of steps necessary to accomplish this transformation.

(3 marks)

(b) Write the individual transformation matrices needed to implement each of the steps in **Q2(a)**. Use homogeneous coordinates.

(6 marks)

(c) Compute the composite transformation matrix which will accomplish the entire transformation.

(6 marks)

Q3 Write appropriate OpenGL commands for each of the following:

(a) Draw a blue coloured triangle.

(7 marks)

(b) Translate the triangle drawn in **Q3(a)** with the translation vector `(50,20)` then rotate it through an angle `45°` about the origin.

(4 marks)

Q4 Polygon data tables can be organized into two groups, geometric table and attribute table.

(a) What is a geometric table?

(2 marks)

(b) What tables should be included to conveniently store geometric data of a polygon ?

(3 marks)

(c) Given a three adjacent polygon surface facets in **Figure Q4**, provide its geometric data-table as answered in **Q4(b)**.

(15 marks)

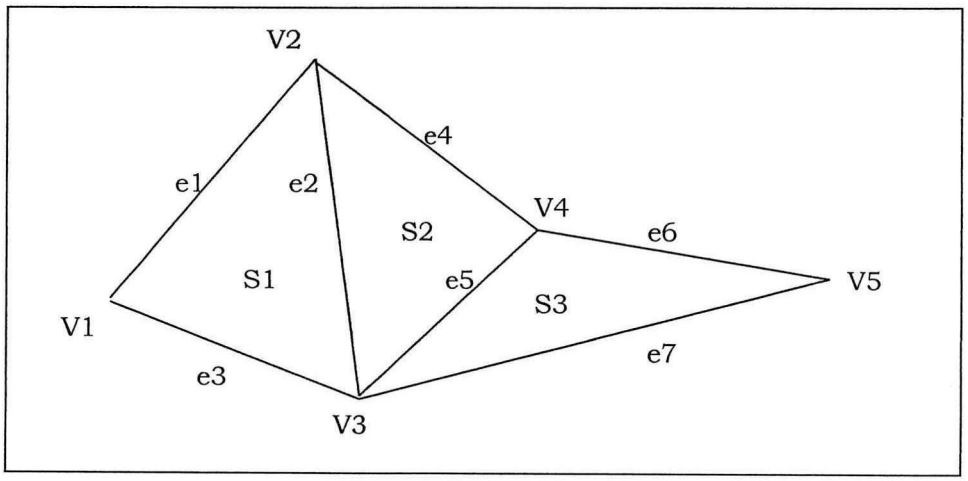

Figure Q4

Q5 (a) The 2D axis rotation equation is easily extended to 3 dimension. Explain how can the rotations transformation equations for about the other 2 coordinate axes be obtained.

(4 marks)

(b) Discuss **TWO (2)** differences between parallel and perspective projections.

(8 marks)

Q6 (a) **Figure Q6** shows a 2D representation of a train. Identify any **TWO (2)** properties of 3D object that can be used to transform the train into a 3D train.

(4 marks)

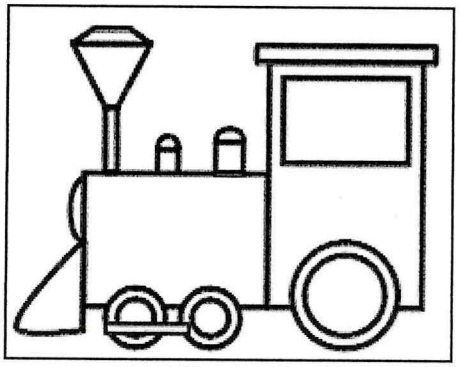

Figure Q6

(b) Based on your anwsers in **Q6(a)**, justify how the properties can be used to transform the 2D image into a 3D object.

(6 marks)

(c) Discuss how you could achieve visual realism of the 3D train.

(4 marks)

- END OF QUESTION -