



# UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV/DEC 2017

**COURSE NO:** CE 273

**COURSE NAME:** COMPUTER GRAPHICS

**CLASS:** CE II

**TIME:** 2HRS 30MINS

Name: \_\_\_\_\_ Index Number: \_\_\_\_\_

**Instructions:** Answer QUESTION 1 and any other 2 questions in your answer booklet.

## QUESTION 1

- a. What do you understand by Computer Graphics?
- b. Briefly explain five (5) application areas of computer graphics?
- c. Give two examples each of the Basic Components of an Interactive Graphic System Input and Display/Output devices.
- d. Identify the properties of Cross products and Dot products of vector.
- e. For each of the following, calculate the coordinates. Indicate whether the result is a point or a vector.
  - a.  $v + u$ , where  $v = (-1, 0, 5)$  and  $u = (2, 1, 1)$
  - b.  $P + v$ , where  $P = (1, 2, 3)$  and  $v = (-1, -2, -3)$
  - c.  $P - Q$ , where  $P = (5, 5, 5)$  and  $Q = (1, 2, 3)$
- f. For each of the following, calculate  $sv$  and  $|sv|$  when
  - a.  $s = 3, v = (1, 1, 1)$
  - b.  $s = 0.25, v = (-4, 8, 2)$
- g. For each of the following vectors  $v$  and  $u$ , calculate the dot product. What does the result tell you about the angle between the vectors?
  - a.  $v = (1, 0, 0)$  and  $u = (0, 1, 0)$
  - b.  $v = (1, 1, -1)$  and  $u = (2, 1, 0)$
  - c.  $v = (-2, 0, 0)$  and  $u = (1, 1, 1)$
- h. Calculate the unit normal vector for the polygon defined by points  $P_0 = (1, 1, 1)$ ,  $P_1 = (5, 1, 4)$  and  $P_2 = (2, 1, 1)$ .
- i. With the help of a diagram, briefly describe the basic graphics rendering pipeline. **30 MARKS**

## QUESTION 2

- a. What do you understand by Thin lens Camera Model?
- b. Identify Application areas of the pinhole camera model.
- c. Explain camera projections.
- d. Describe perspective projections.

**15 MARKS**

## QUESTION 3

- a) What do you understand by Rasterization?
- b) Explain Z-buffering and state its uses.
- c) Briefly explain the z-buffer algorithm

**15 MARKS**

## QUESTION 4

- a. What do you understand by texture mapping?
- b. Identify application areas of texture mapping.
- c. In what scenario is environmental mapping applicable?
- d. Compare bump mapping to a displacement mapping.

**15 MARKS**

## QUESTION 5

- a. What do you understand by colour theory?
- b. Explain the following colour models
  - i. RGB colour model
  - ii. CYMK colour Model
  - iii. HSV and HSL colour models
- c. Identify the properties of light and relate them to colour models discussed above.

**15 MARKS**

## QUESTION 6

- a. What do you understand by raytracing?
- b. What makes it different from other scanline rendering methods?
- c. State the advantages of monte-carlo raytracing.
- d. What is BSP trees?

**15 MARKS**