PAN AFRICA CHRISTIAN UNIVERSITY
EXAMINATIONS PAPER

EPAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: **COMPUTING AND INFORMATION TECHNOLOGY**

COURSE CODE: **BIT /BICT 400**

COURSE TITLE: **COMPUTER GRAPHICS**

EXAM DATE: **December, 2021**

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B.**
- Write only your **student number** on the answer booklet provided.
- None programmable calculator permitted
- Calculators on phones, tablets and computers are NOT permitted in Theory Papers

SECTION A

(Answer ALL questions in this section)

SECTION A

QUESTION ONE

a) If you could build your own virtual reality system. Describe the hardware, the types of user interaction and the domain you would use **[6 Marks]**

b) Imagine point p(X, Y) is to be rotated about the origin by angle theta to location p'(X',Y').Using diagram. Illustrate the how to rotate geometric. **[4 Marks]**

SECTION **[Answer any THREE questions]**

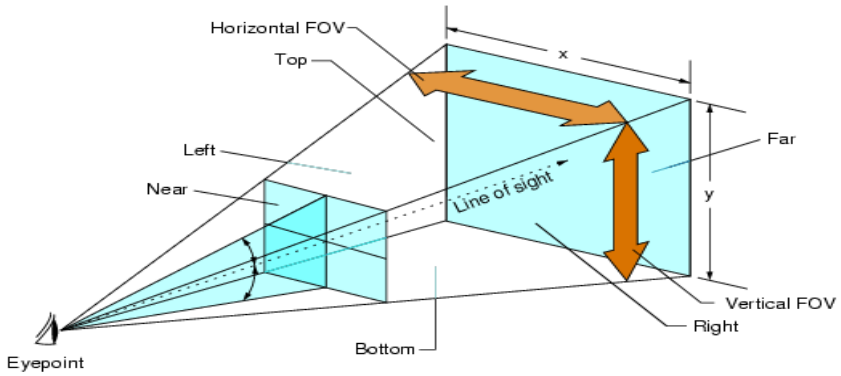
QUESTION TWO.

a) Using illustrations, write components for a 2D translation that moves all points in an object along the same straight-line path to new positions**.** **[5 Marks]**

b) Using illustrations, discuss the intersection of the ray with transformed objects **[5 Marks]**

QUESTION THREE

a) Use the diagram below to answer the questions.



$$\text{Aspect Ratio} = \frac{y}{x} = \frac{\tan(\text{vertical FOV}/2)}{\tan(\text{horizontal FOV}/2)}$$

i) Explain how we determine the photons on a piece of geometry

[3 Marks]

ii) Identify any **TWO** challenges of 3D to 2D projection from above. **[2 Marks]**

b) i) Explain why visible surface determination and shadow generation algorithms address a similar problem.

iii) Explain why is resolution more of a problem for the shadow z buffer than for the hidden surface z buffer **[5 Marks]**

QUESTION FOUR

a) Determine a sequence of basic transformations that are equivalent to the y-direction shearing matrix **[6 Marks]**

b) Calculate the values of R, S and T of the line equation for each (K_P, J_P) and (K_R, J_R). Illustrate the linear equation for the values**.** **[4 Marks]**

QUESTION FIVE

a) i) Explain how can the first stage of a ray tracer be used for visible surface determination

ii) From above, determine if algorithm an image precision algorithm or an object precision algorithm?

[5 Marks]

iii) Consider the line from (3,4) to (3, 3). Use the Bresenham's algorithm to rasterize this line. **[5 Marks]**

QUESTION SIX

a) Using GIMP, highlight steps to be followed for design icon below**.** **[7 Marks]**

b) Using above floating logo, explain how to fill new layer with some color to add some interest and plasma plumbing**.** **[3 Marks]**

