

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

**THIRD YEAR SEMESTER TWO EXAMINATION FOR THE AWARD OF
DEGREE OF BACHELOR OF COMPUTER SCIENCE AND APPLIED COMPUTER
SCIENCE**

COSC 371 AND ACSC 374: COMPUTER GRAPHICS

STREAMS (BSC. COMP SCIENCE, APCS)

TIME: 2 HOURS

DAY/DATE: MONDAY 16/11/2020

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS:

- **ANSWER YOUR QUESTIONS IN ANSWER BOOKLET PROVIDED**
- **ANSWER QUESTION ONE [COMPULSORY] AND ANY OTHER TWO QUESTIONS**

QUESTION ONE (30 MARKS)

- a) With aid of examples, matrices and diagrams briefly describe the geometric transformations. (8 marks)
- b) Define the following terms (8 marks)
- Computer graphic.
 - Scalar
 - Point.
 - Vector.
- c) Briefly describe the historical developments that computer graphics have undergone up to the present moment (6 marks)
- d) What is pinhole camera? (2 marks)

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- e) Define the term aliasing (3 marks)
- f) Discuss the ray tracing process (3 marks)

QUESTION TWO (20 MARKS)

- a) State any Four characteristics of translations (4 marks)
- b) Describe the term polygon, and illustrate how to determine the vertices of an n-gon. (8 marks)
- c) Discuss the Cohen- Sutherland line clipping algorithm (8 marks)

QUESTION THREE (20 MARKS)

- a) A polygon is identified by the following positions. Identify the new positions after the polygon is scaled by a scaling factor of 2 at the reference point (2,2), (3,3), (4,6),(8,3)(9,6). Show your workings (8 marks)
- b) Explain the meaning of the term parallel projection and explain where it is most applicable. (6 marks)
- c) Find the angle between vectors (3,7) and (-4,5). (6 marks)

QUESTION FOUR (TWENTY MARKS)

- a) Define the term CRT, and briefly explain the functions of the following components in a CRT. (12 marks)
 - i. Focusing system.
 - ii. Deflection system.
 - iii. Electron gun.
- b) Illustrate your understanding of the following terms as used in Computer Graphics and give a brief description of each (8 marks)
 - i. Vertical Retrace.
 - ii. Horizontal Retrace.

QUESTION FIVE (TWENTY MARKS)

- a) Derive the identity matrix for rotation given the double angle formulas: $\sin(A + B) = \sin A \cos B + \cos A \sin B$ and $\cos(A+B) = \cos A \cos B - \sin A \sin B$. (6 marks)

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- b) Rotate by 45 degrees anti-clockwise, a polygon with the following end points (10,10)
(13,10), (13,13) and (10,13) (5 marks)
- c) Using suitable illustration describe the BSP trees algorithm (8 marks)
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