ELIZADE UNIVERSITY

ILARA-MOKIN

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd **SEMESTER EXAMINATION**
2015 / 2016 **ACADEMIC SESSION**

COURSE CODE: CSC 412

COURSE TITLE: Computer Graphics and Visualization

COURSE LEADER: Dr. Kehinde Agbele & Mr. E.F. Ayetiran

DURATION: 2 ½ Hours

HOD's SIGNATURE

INSTRUCTION:

The paper will contain SIX Questions. You should answer any FOUR Questions. For each Question 15 marks are available. There are 60 marks in total for the exam paper; each question will be marked out of 15.

Students are warned that possession of any unauthorized materials in an examination is a serious offence

1. Consider a cylinder with an elliptic cross-section (i.e a non-uniformly scaled standard cylinder). The semi-axes of the ellipse have lengths x and y, the height of the cylinder is h. Top and bottom are open.

   (a) Use appropriate illustration for the above description. **(5 marks)**

   (b) Give an implicit description of the surface: as an equation f(x,y,z) = 0 and one or more inequalities **(5 marks)**

   (c) State two differences between the features of *convex* and *concave* polygons **(5 marks)**

2. Briefly discuss any five application areas of computer graphics **(15 marks)**

3. Briefly describe the method to test if a point is inside or outside a polygon **(5 marks)**

   (b) Differentiate between ray-casting and ray-tracing? **(5 marks)**

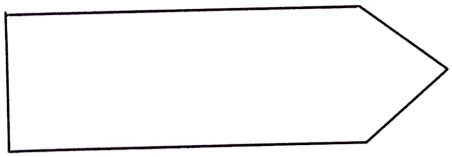
   (c) State two differences between the features of perspective projection and parallel projection (**5 marks)**

4. (a) Describe the Painter's algorithm for hidden surface removal **(4 marks)**

   (b) Write a pseudocode to describe the implementation of the algorithm. Explain the operation of the pseudocode. **(6 marks)**

   (c) Given the x and y values of a pixel, state formally with explanations, the midpoint algorithm for line drawing **(5 marks)**

5. Consider the polygon below:



   (a) Write the OpenGL geometric primitives to implement it **(5 marks)**

   (b) Modify (a) above to show only the vertex points **(5 marks)**

   (c) (i) What is rasterization? **(2 marks)**

   (ii) Explain the term pixel **(3 marks)**

6. (a) Write the equations for subtractive colours derived by mixing the additive colours and the corresponding coordinates of both the additive and the derived subtractive colours **(6 marks)**

   (b) Illustrate the relationships among the additive colours and the subtractive colours as a set diagram (venn diagram) **(3 marks)**

   (c) Write the OpenGL commands for the additive and subtractive colours using their coordinates and specify the colours as a comment in front of each command **(6 marks)**