



CRAWFORD UNIVERSITY, FAITH CITY IGBESA
COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF COMPUTER AND MATHEMATICAL SCIENCES
HARMATTAN SEMESTER SESSION: 2023/2024 COURSE CODE: CSC 407
COURSE TITLE: COMPUTER GRAPHICS AND VISUALISATION UNITS: 3 TIME: 2 ½ HOURS

Instruction: Answer Four (4) questions in all

Question One

- a. Describe what you understand by Computer Graphics and why do we study it? 4 marks
- b. Mention five (5) areas where Computer graphics can be applied. 5marks
- c. Computer graphics don't work in isolation. It requires hardware that houses the software. State three (3) hardware and software tools each that is required in graphics applications 6marks

Question Two

- a. Explain the following Graphic Data Structures:
- i. Quadtrees 2marks
 - ii. BSP trees 2marks
- b. The RGB color model varies from CMY model. Explain the need for color and differentiate between the two models 4marks
- c. Write the equations that convert a color in the CMY model to the RGB model. Find the RGB coordinates of a color at (0.43, .87, 0.18) of the CMY coordinates 3marks
- d. What is C1 continuity? How is it different from G1 continuity? 2marks
- e. Draw a spline curve comprising two Bezier curve segments in which the derivatives at the joint are in OPPOSITE directions. 2marks

Question Three

- a. Differentiate between Analogue Image and Digital Image 2marks
- b. Define a Pixel in correlation with resolution of an image 3marks
- c.
- i. Define the term Frame Buffer 2marks
 - ii. State the three basic ways of encoding a frame buffer 3 marks
- d. Consider two raster systems with the resolutions of 640 x 360 and 1280 x 1024.
- i. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? 3marks
 - ii. What is the access time per pixel in each system? 2marks

Question Four

- a. Explain the four (4) basic different types of Transformations in 2-D and 3-D? 8marks
- b. Translate the square ABCD whose co-ordinate are A(4,0), B(3,0), C(3,3), D(4,3) by 1.5 units in both direction and then scale it by 3 units in x direction and 1.5 units in y direction. 5marks
- c. Perform a 270° rotation of a triangle A(0,0), B(1,1), C(5,2) about the origin. 2marks

Question Five

- a. What do you mean by scan conversion? 2marks
- b. Digitize the line with end points (15, 10) & (25, 18) using any Line Drawing Algorithm of choice. 5marks
- c. The intersection of a ray with a sphere can take three forms. Determine the solution that will result from the intersections given:
- i. The coordinates of the intersection as $r(t) = e + td$ 2marks
 - ii. The implicit representation of a sphere to be $f(p) = 0$ where a sphere is defined by $(x - s_x)^2 + (y - s_y)^2 + (z - s_z)^2 = r^2$ 6marks

Question Six

- a. Give two examples from the real world of light sources best approximated by point light sources, and by directional light sources. 2 marks
- b. Differentiate between ambient, diffuse and specular light 3marks
- c. How does Phong shading differ from Gouraud Shading? 4marks
- d. Describe the different coordinate systems used for texture mapping. 4 marks
- e. What are Mip Maps? Give an example of when they are useful. Why are they used? 2 marks

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