BRAC UNIVERSITY

A

Department of Computer Science and Engineering

Examination: Semester Final Exam | Semester: Fall 2022
Duration: 1 hour 40 minutes | Full Marks: 40

CSE 423: Computer Graphics

Name:	ID:	Section:

[Answer all the questions]

1 Rafid drew a triangle on a piece of paper with a co-ordinate system and rotated it 90° about the point (1,1) in the clockwise direction. Then, he reflected it about the line y=x and finally uniformly scaled it with a factor of 3 about the point (0,0). After that, he found that the triangle was located with vertices (1,2), (2,1) and (-1,-1).

CO3 a. Assume before reflection, the position of one vertex of the triangle was (-1, 2). **Identify** the position of that vertex after transformation if only the reflection was applied? **4**

CO1 b. **Show** the composite matrix formulation for the above transformations considering the full scenario. **[You do not need to calculate the matrix multiplication]** **3**

CO1 c. **Determine** the geometric properties which are preserved after the final transformation. [Hint: distance, ratio, angle] **3**

2 **CO1** a. **Explain** how ambient light works in Phong's Lighting Model? **2**

CO1 b. Briefly **discuss** the concept of Attenuation of Light. **2**

CO2 c. Let (-70, 500, 420) be the coordinate of the light source of intensity $\mathbf{I_p}$= 0.80 unit. The light is illuminating a point on a sphere with coordinates (-25, 100, 75). Given that the center of the sphere is at the origin (0, 0, 0) and the absorption coefficient for diffuse reflection is $\mathbf{K_d}$=0.80 unit. **Calculate** the intensity of diffuse reflection for the point. **5**

CO3 d. Assume, you are given two photos of the different teapots where one is shining sharply and another one is looking dull. **Identify** which one has the larger specular exponent. **1**

3 **CO1** a. **What** do you understand by monochromatic light? Suppose you want to design a monochromatic light of intensity 0.5 with RGB color model. **Determine** the parameters of the model to attain the above scenario? **3**

CO1 b. Mr. Ross is a xeroxer. He got a Microsoft Word file for printing. At first, he opened the file and checked it on the monitor. Then, he printed the file using a color printer. **Choose** the color models used in the devices used by Mr. Ross? **2**

CO3 c. For a CMY model, values are given as follows: C = 0.3, M = 0.4, and Y = 0.6. **Compute** the Hue, Saturation, and Brightness of that model. **5**

4	**CO3**	a.	**Explain** the differences between perspective projection and parallel projection.	**3**
	CO3	b.	Mr. Roy is a wildlife photographer. While visiting the Amazon, he took a photo of a Jaguar. Unfortunately, he could not take a full-body photo of that Jaguar since it was very close to his position. Due to **which** projection mechanism this scenario happened? **State** your reasons.	**2**
	CO3	c.	Suppose for a Perspective Projection, the origin is at the Projection Plane (PP) and the Center of Projection (COP) is at a distance of 175 units from the PP and the projection plane is on the xy plane. **Calculate** the coordinates of the projected pixel **P'** for the point P(35, 60, -300)?	**5**

BRAC UNIVERSITY

B

Department of Computer Science and Engineering

Examination: Semester Final Exam | Semester: Fall 2022
Duration: 1 hour 40 minutes | Full Marks: 40

CSE 423: Computer Graphics

Name:	ID:	Section:

[Answer all the questions]

1 Munia drew a triangle on a piece of paper with a co-ordinate system and reflected it about the line y = x. Then she uniformly scaled it with a factor of 2 about the point (0,0) and finally rotated it 90° about the point -1,-1. After that, he found that the triangle was located with vertices (3,2), (-2,0) and (1,2).

CO3 a. Assume before reflection, the position of one vertex of the triangle was (2, 1). **Identify** the position of that vertex after transformation if only the reflection was applied? **4**

CO1 b. **Show** the composite matrix formulation for the above transformations considering the full scenario. **[You do not need to calculate the matrix multiplication]** **3**

CO1 c. **Determine** the geometric properties which are preserved after the final transformation. [Hint: distance, ratio, angle] **3**

2 **CO1** a. **Explain** how ambient light works in Phong's Lighting Model? **2**

CO1 b. Briefly **discuss** the concept of Attenuation of Light? **2**

CO2 c. Let (-58, 300, 750) be the coordinate of the light source of intensity $\mathbf{I_p}$= 0.90 unit. The light is illuminating a point on a sphere with coordinates (-30, 25, 30). Given that the center of the sphere is at the origin (0, 0, 0) and the absorption coefficient for diffuse reflection is $\mathbf{K_d}$=0.70 unit. **Calculate** the intensity of diffuse reflection for the point. **5**

CO3 d. Assume, you are given two photos of the different teapots where one is shining sharply and another one is looking dull. **Identify** which one has the smaller specular exponent. **1**

3 **CO1** a. **What** do you understand by monochromatic light? Suppose you want to design a monochromatic light of intensity 0.7 with RGB color model. **Determine** the parameters of the model to attain the above scenario? **3**

CO1 b. Mr. Chandler is a graphic designer. He drew a design for printing in the Paint software. At first, he opened the file and checked it on the monitor. Then, he printed it using a color printer. **Choose** the color models used in the devices used by Mr. Chandler? **2**

CO3 c. For a CMY model, values are given as follows: C = 0.6, M = 0.2, and Y = 0.3. **Compute** the Hue, Saturation, and Brightness of that model. **5**

4	**CO3**	a.	**Explain** the differences between orthographic projection and oblique projection?	**3**
	CO3	b.	Ms. Mosby is a wildlife photographer. While visiting the Amazon, she took a photo of a Jaguar. Unfortunately, she could not take a full-body photo of that Jaguar since it was very close to her position. Due to **which** projection mechanism this scenario happened? **State** your reasons.	**2**
	CO3	c.	Suppose for a Perspective Projection, the origin is at the Projection Plane (PP) and the Center of Projection (COP) is at a distance of 250 units from the PP. The projection plane is on the xy plane. **Calculate** the coordinates of the projected pixel **P'** for the point P(-30, 220, -600)?	**5**