Department of Computer Science & Engineering
University of Asia Pacific (UAP)
Program: B.Sc. in Computer Science and Engineering

Mid Semester Examination **Spring 2021** **4th Year 2nd Semester**
Course Code: CSE 425 **Course Title: Computer Graphics** **Credits: 3**

Full Marks: 60 **Duration: 1 Hour + 20 minutes (submission time)**

Instructions:
There are Four Questions. Answer three questions including Q-1 and Q-2.

1. a) Identify if the following equations are Affine Combination or not. Justify your answer by stating the reason. 3+3+4 =10

i. $Q_1 = (1 - t)^2 P_1 + 2t^2 (1 - t) P_2 + t^2 P_3$
ii. $Q_2 = t^2 P_1 + (1-t^2) P_2$

Write the equation(s) which is / are Affine Combination in to matrix format.

b) What will be the color of the point Q (R, G, B) inside a triangle if the color of the vertices of the triangle are A (1, 0.5, 0.1), B (0.5, 0.8, 0.3), C (0, 0, 1) and the value of $\boldsymbol{\alpha_1 = u}$, $\boldsymbol{\alpha_2 = v}$? Where 10

u = (Last digit of your id) / 50

v = u + 0.1

2. a) Calculate the Viewing Matrix, V if the Angle of View, $\alpha = \mathbf{a^0}$, near plane distance = **b**, far plane distance = **c**. Where, 10

a = Last two digits of your ID + 15

b = Last two digits of your ID + 5

c = b + 15

b) Briefly describe the process of Camera Transformation. 10

3. **a)** Rotate the following triangle ABC (coordinates of A, B, C are given in the Fig. 1) with θ = 45° about a point P **(- a, b).** Find the matrices needed for the operation and the new coordinates of the triangle after the operation. 15

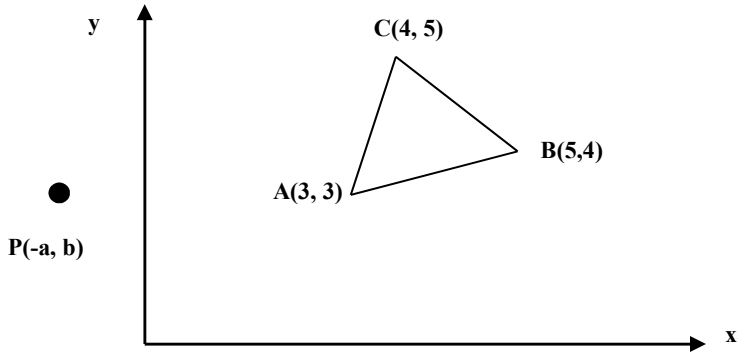

Fig. 1

Where

a = (Last 2 digits of your id) % 4 +2

b = (Last 2 digits of your id) % 6 + 1

b) Show that a Scaling and a Translation is not a commutative operations 5

4. **a)** Convert the HSI coordinate of a color at **(a^o, b, c)** in to RGB color space where 15

$a = 260^0 – (\text{Last 2 digits of your id})^0$

b = (Last 2 digits of your id) / (Last 2 digits of your id + 10)

c = (Last 2 digits of your id) / (Last 2 digits of your id + 5)

b) If we apply 1) Translate by **(a, b)** and then 2) Scale by **(c, d)** to the line P1 (3, 2) and P2 (15, 12). What will be the new coordinates of P1 and P2 after transformation? 5

Where

a = Last 2 digits of your id + 10 ; b = Last 2 digits of your id + 8

c = integer (a /2) ; d = integer (b/2)