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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: B.Tech_CSE
Program: Computer Graphics for all CSE Branches
Course Code: CSEG2130

Semester: IV
Time : 03 hrs.
Max. Marks: 100

Instructions: Check the questions very minutely. Utilize your time according to the marks listed for every questions.

SECTION A (5Qx4M=20Marks)

Each Question will carry 4 Marks. Explain max by 50-60 words wherever required. Attempt all questions from Sec A.

S. No.	Question	Marks	CO
Q 1.	Explain the term Resolution and how long would it take to load a 640X400 frame buffer with 12 bit per pixel (10^6 bits can be transferred per second).	1+3=4	CO1
Q 2.	Justify that OPEN GL is platform independent with proper explanation.	4	CO1
Q 3.	Define the term Composite Transformation with required matrix representations.	4	CO2
Q 4.	Differentiate in between Gouraud and Phong Shading with their specific advantages	4	CO4
Q 5.	Define Concave and Convex polygon with proper diagram.	4	CO3

SECTION B (4Qx10M= 40 Marks)

Each question will carry 10 marks. Make diagrams wherever needed. Write short / brief notes (Explain max by 100-150 words wherever required). Moreover, solve the problems properly with matrix representations wherever needed. Attempt all questions and there is an option for Q9.

Q 6.	a) Define the DDA Line drawing algorithm. (4 marks) b) Consider the line from (5,5) to (13,9). Use the Brasenham's algorithm to rasterize the line. (6 marks)	10	CO2
Q 7.	a) Explain Z buffer algorithm with its advantages and disadvantages. (5 marks) b) Calculate the mean unit surface normal to a polygon described by 4 position vector A (2,0,0), B (0,2,0), C (0,0,2) and D (2.2, -2, 2). (5 marks)	10	CO4
Q 8.	a) Apply Liang and barsky line clipping algorithm for calculating the saved portion of line from (2,7) to (8,12) in a window ($X_{wmin} = Y_{wmin} = 5$ and $X_{wmax} = Y_{wmax} = 10$) (8 marks) b) Explain the types of text clipping by using proper diagram. (2 marks)	10	CO3

Q 9.	<p><u>Attempt 9(a) or 9(b and C)</u></p> <p>a) A mirror is placed vertically such that it passes through the points (10,0), and (0,10). Find the reflected view of Triangle ABC with coordinates A(5,50), B (20,40), C(10,70). (10 marks)</p> <p style="text-align: center;">OR</p> <p>b) Explain the matrix representation with proper diagram for rotation about x-axis, y-axis and z-axis. (7 marks)</p> <p>c) Consider the effect of translation in the x,y,z direction by -2, -4 and -6 respectively on the homogenous coordinate position vector [1,6,4]. What will be the new coordinates? (3 marks)</p>	10	CO3
<p>SECTION-C (2Qx20M=40 Marks)</p> <p>Each Question carries 20 Marks. Instruction: Write long answer. Explain max by 200 words wherever required. Make diagrams wherever needed. Attempt all questions and there is an option for Q11.</p>			
Q 10.	<p>a) Explain the matrix and diagrammatic representation of reflection relative to co ordinate axis (reflection ay Y axis, X axis and Z axis) and relative to planes (through XY, YZ, XZ plane). (10 marks).</p> <p>b) Calculate, For window, $X_{wmin} = 20$, $X_{wmax} = 80$, $Y_{wmin} = 40$, $Y_{wmax} = 80$ and for viewport, $X_{vmin} = 30$, $X_{vmax} = 60$, $Y_{vmin} = 40$, $Y_{vmax} = 60$. Now a point (X_w, Y_w) be (30, 80) on the window. Calculate the point on the viewport i.e (X_v, Y_v). And explain the 2D viewing pipeline process. (7+3=10 marks)</p>	20	CO2
Q 11.	<p><u>Attempt 11(a and b) or 11(c)</u></p> <p>a) Find equation of Bezier curve which passes through points (0,0) and (-2,1) and is controlled through points (7,5) and (2,0). (10 marks)</p> <p>b) Write short note on (Any two): (2*5=10 marks)</p> <p>(i) RGB Color model.</p> <p>(ii) Knot Vector.</p> <p>(iii) Beizer Curve Properties.</p> <p>(iv) Interpolation.</p> <p style="text-align: center;">OR</p> <p>c) Illustrate the solution for scan line filling algorithm for a polygon {A, B, C, D, E, F, G}. whose vertices are {(2,7) (4,12) (8,15) (16,9) (11,5) (8,7) (5,5) }. Prepare all edge tables according to scan line filling algorithm. (20 marks)</p>	20	CO4