OFC

Roll Number: _____ Name: _____ Group: _____

Thapar Institute of Engineering & Technology, Patiala

Computer Science & Engineering Department

END SEMESTER EXAMINATION

B. E. (3rd Year) Course Code: UCS505

Date: 29th May 2022 Course Name: Computer Graphics

Time: 10 mins, M. Marks: 10 Faculty: Anupam Garg, Amrita Kaur, Kuntal Choudhary, Harpreet Singh, Samya Muhuri,

Note:

1. Write your answers only in capital letters in the space provided at the end of the quiz.
2. Overwriting and cutting will lead to zero marks.

1. The B-spline curve is formed from 6 control points using an equation of degree 3, then the number of segments formed in the curve are:
   A. 3 B. 4
   C. 5 D. 6

2. B-spline curve is formed from 5 control points using equation of degree 3. The knot values u_k (0<=k<4) are:
   A. (0,0,0,1)
   B. (0,1,2,3)
   C. (1,2,3,4)
   D. (0,0,1,2)

3. The curve is ..... if the tangent vectors are having the same direction not necessarily its magnitude of the two successive sections
   A. First order parametric continuity
   B. Second order parametric continuity
   C. First order geometric continuity
   D. Second order geometric continuity

4. The relationship between the degree of the curve equation and the interpolation points is:
   A. Degree of curve equation is equal to number of interpolation points.
   B. Degree of curve equation is one less than the number of interpolation points.
   C. Degree of curve equation is one greater than the number of interpolation points.
   D. None of these

5. The region code of 100001 identifies a point in which planes.
   A. Above and behind the viewport
   B. Left and behind the viewport
   C. Left and above plane
   D. Bottom and right plane

6. Choose the incorrect statement
   A. Vector L is known as Look at point which is the point of focus to get the projection coordinates
   B. Vector N is known as view plane normal vector which is perpendicular to view plane.
   C. Vector V is view up vector that arises in the updirection of the camera and should be parallel to the y-axis.
   D. The U vector can be calculated from the other two vectors and is parallel to the z-axis.

7. The sequence of the 3D viewing pipeline coordinates are:
   A. MC to WC to VC to PC to NC to DC.
   B. WC to VC to MC to PC to NC to DC.
   C. WC to VC to PC to NC to MC to DC.
   D. DC to WC to VC to NC to MC to PC.

8. The subcategories of orthographic projection are:
   A. Cavalier, cabinet, isometric
   B. Cavalier, cabinet
   C. Isometric, diametric, trimetric
   D. Isometric, cavalier, trimetric

9. The stopping condition for surface visibility of Area subdivision algorithm is:
   A. All surfaces are inside surfaces with respect to the area
   B. All surfaces are outside surfaces with respect to the area.
   C. A surrounding surface reveals all the surfaces within the area boundaries.
   D. At least one inside, overlapping or surrounding surface is in the area.

10. Which of the following statements are true for shading models?
    S1: Gouraud shading eliminates the intensity discontinuities that occur in flat shading
    S2: Different intensities are calculated for each polygon using constant-intensity shading
    S3: Normal vector interpolation shading eliminates the Mach-band effect
    S4: Gouraud shading eliminates the Mach band effect
    A. S1, S2, S4
    B. S2, S3
    C. S1, S3
    D. S1, S2, S3

Question	1	2	3	4	5	6	7	8	9	10
Answer										

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Thapar Institute of Engineering & Technology, Patiala

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END SEMESTER EXAMINATION

B. E. (3rd Year)

Course Code: UCS505

Course Name: Computer Graphics

Date: 29th May 2022

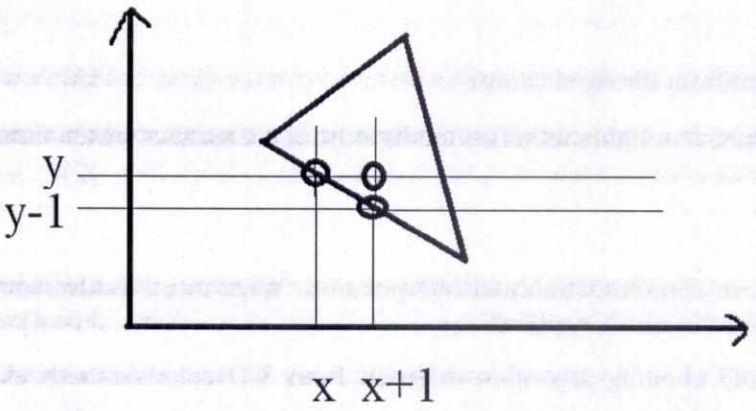
Time: 2 Hours, M. Marks: 35

Faculty: Anupam Garg, Amrita Kaur, Kuntal Choudhary, Harpreet Singh, Samya Muhuri

Note: All questions are compulsory

1. Derive the equation of 3rd degree Bezier curve with proper notations by considering P(u) = f(x(u), y(u), z(u)). Write down the recursive equation of Bspline bending function. Write down any two properties of Bezier curve. Write down the mathematical equation of Bezier Surface and B Spline Surface. [3+1+1+2]

2. a) Two scan lines are given for the following polygon. [2]



Write the depth value (Z) equation for the next given co-ordinate positions (Z'_{x+1}) and (Z''_{y+1}).

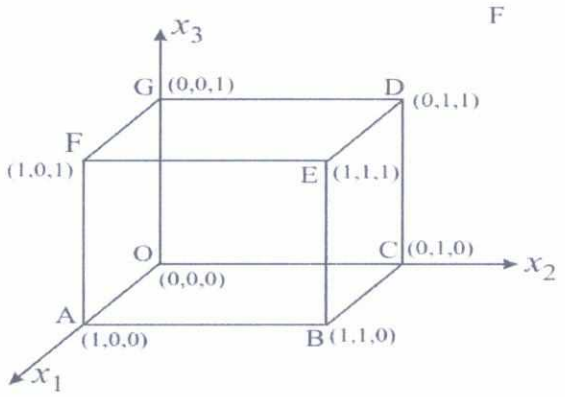
b) Given two triangles P with vertices P1(100,100,50), P2(50,50,50), P3(150,50,50) and Q with vertices Q1(40,80,60), Q2(70,70,50), Q3 (10,75,70), determine which triangle should be painted first using the scanline method. [3]

c) What is the advantage of coherence property in graphical representation of a scene? [2]

3. (a) In the perspective projection, if the centre of projection is (0, 0, -5) and view plane is xy plane, find the projection of points A (4, 5, 3) and B (2, 8, 6). Find the mirror reflection of projected

points about yz plane. Where would be the principal vanishing points? Also, what would be the projected image of a point (10, 15, -5)? Which anomaly of perspective projection is represented by this situation? [5]

(b)What are the points of cabinet projection of the following unit cube with $\theta = 60^0$? [2]



4. a) Define the terms: [2]

i. Intensity Attenuation
ii. Diffuse reflection
iii. Specular reflection
iv. Ambient light

b) How Gouraud shading is different from Phong shading? [3]

c) To find the relationship between incident light and reflection light from the surface, which law will be helpful and why? [2]

5. (a) Explain the difference between approximation and interpolation. What are the different conditions to check the smoothness of the curve, explain? [1+ 4]

(b) How the 2-D cohen-sutherland clipping algorithm different from 3-D cohen-sutherland clipping algorithm. [2]