Exam Roll No.....

Tribhuvan University

Institute of Science and Technology

2082

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Bachelor Level / Second Year/ Third Semester/ Science

Computer Science and Information Technology (CSC 214)

(Computer Graphics)

(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Section A

Attempt any TWO questions. **(2 × 10 = 20)**

1. Explain Bresenham's line drawing algorithms. Compare it with DDA line algorithm. Draw a line from (2, 3) to (10, 8) by using Bresenham's algorithm. [4+3+3]

2. What is a polygon mesh? Describe its types. Construct a polygon table and edge table for a cube of side 2 units placed with one vertex at origin. [4+6]

3. Explain the Painter's algorithm for visible surface detection. Explain the BSP tree method used for visible surface determination. How does it divide the space and organize objects in a scene? [4+4+2]

Section B

Attempt any EIGHT questions. **(8 × 5 = 40)**

4. Explain the need for machine-independent graphics languages. How do such standards benefit application developers? [3+2]

5. Define 2D rotation in computer graphics. Derive the rotation matrix and calculate the new coordinates of a point (2, 3) after a rotation of 45° about the origin. [1+4]

6. How is the transformation matrix computed when switching from one coordinate system to another? Illustrate with an example. [5]

7. Explain the 3D viewing pipeline in computer graphics. Explain about how a 3D world coordinate system is transformed to a 2D screen? [2.5+2.5]

8. For control points P0(0,0), P1(1,2), P2(3,3), and P3(4,0), calculate the Bezier curve point at u = 0.5. Also plot the rough curve shape. [5]

9. What is spatial-partitioning representation? Explain how it differs from boundary representation in terms of geometry storage and processing. [1+4]

10. What is constant intensity shading? Compare Phong shading and fast Phong shading. [1+4]

11. Discuss the use of virtual reality in education. How does VR enhance student engagement and learning outcomes? [2.5+2.5]

12. Write short notes on [2x2.5=5]
    a. Lighting in OpenGL.
    b. Orthographic projection.