JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-V Semester (CS/IT)

COURSE CODE (CREDITS): 18B11CI515 (3)   MAX. MARKS: 25

COURSE NAME: Computer Graphics

COURSE INSTRUCTORS: Dr. Yugal Kumar, Dr. Himanshu,   MAX. TIME: 1.5 Hour
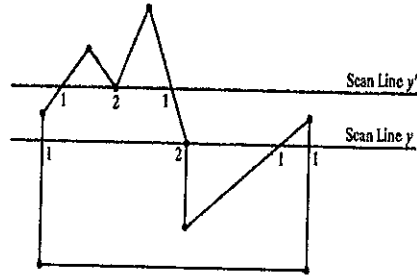
Mr. Prateek Thakral, Dr Shubham Goyal

Note: All questions are compulsory. Marks are indicated against each question in small brackets.

Q.1 [CO3] a) Suppose, Liang Barsky and Cohen Sutherland algorithms are mentioned to clip the line segments. You   (2+3+3+2)
are preferred Linag Barsky algorithm over Cohen Sutherland algorithm as it is more efficient. Discuss its
pinpoint efficiency than Cohen Sutherland algorithm.

b) Suppose, different line orientations relative to clipping window are mentioned. Specify, numbers of
arithmetic operations are performed by NLN algorithm in comparison to Liang Barsky and Cohen
Sutherland algorithms. Discuss in detail.

c) A point (xw, yw) in clipping window is mapped to a normalized coordinate position (x_{norm}, y_{norm}),
then to a screen coordinate position (xv, yv) in a viewport. Finally, object is clipped against the
normalization square [-1, 1] prior transformation to viewport coordinate. Discuss the mapping of entire
scenario.

d) Describe the situation in which you will not perform completely inside and outside test for clipping of
line. Justify your statement with proper proof.

Q.2 [CO3] a) Justify the statement such that two successive reflections about any line in the XY plane which   (3+3+3)
intersects the coordinate origin is equivalent to a rotation in the XY plane about the origin.

b) Derive the two dimensional transformation matrix for scaling in an arbitrary direction that can include
coordinates for any specified scaling fixed point (x_f, y_f).

c) What do you understand by rigid body transformation? Describe it with transformation matrix and also
specify a situation for rigid motion transformation.

Q.3 [CO2] a) Consider the following straight line segment for performing the supersampling. How the intensity level   (3+3)
can be described for the given line segment as well as pixels? Also discuss the impact of intensity level
on the antialiasing.
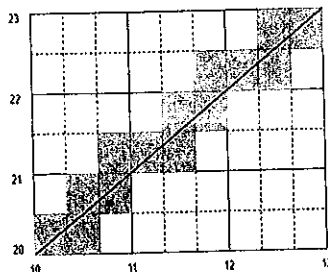
b) Suppose, you have given the following figure and your task is to detect the topological difference between the scan line y' and scan line y. How you will detect the topological difference. In similar way, describe the coherence properties and how these properties reduce the processing in terms of graphics algorithms?