## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT TEST-2 EXAMINATION - 2023

B. Tech-V Semester (CSE)

COURSE CODE (CREDITS): 18B11CI515 (3)

MAX. MARKS: 25

**COURSE NAME:** Computer Graphics

MAX. TIME: 1 Hour 30 Minutes

COURSE INSTRUCTORS: Dr. Amol Vasudeva, Dr. Nancy Singla, Dr. Anita, and Sh. Prateek

## Note:

(a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

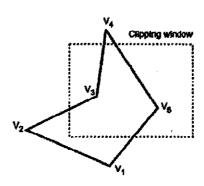
(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

- 1. Consider a 2D rectangle ABCD where A=(0,0), B=(2,0), C=(2,1) and D=(0,1). We want to apply a 2D transformation to this rectangle which makes it a parallelogram ABEF where E = (3, 1) and F= (1, 1).
  - (a) What kind of 2D-transformation is this? Explain.
  - (b) Mention the 3x3 transformation matrix M to achieve the given transformation?
  - (c) What additional transformation N we would need to apply to ABEF to get the parallelogram A'B'E'F', where A'=(2,1), B=(4,1), E'=(5,2), and F'=(3,2)?
  - (d) What is the final concatenated matrix in forms of M and N that will transform ABCD to A'B'E'F'? (CO-3) [1+1+2+3=7 marks]
- 2. Rotate a triangle placed at A(0.0), B(1.1) and C(5.2) by an angle 45 degrees in anticlockwise direction with respect to point P(-1,-1). Obtain the composite transformation matrix and the coordinates of the rotated triangle. (CO-3) [5 marks]
- 3. Use the Cohen-Sutherland algorithm to clip two lines P1(35,10)-P2(65,40) and P3(65,20)-P4(95,10) against a window A(50,10), B(80,10), C(80,40) and D(50,40).

(CO-2) [6 marks]

(a) Describe Sutherland-Hodgeman Polygon clipping algorithm.

(b) Apply various steps of Sutherland-Hodgeman polygon clipping algorithm (starting from vertex v1 in counterclockwise direction) to clip the polygon given in the figure below. Draw the final polygon thus obtained after clipping. (CO-2) [3+4=7 marks]



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