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

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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

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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 terms 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 anti-clockwise 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]**

4.
   (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]**